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Table of Contents

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ORIGINAL ARTICLES— PAGE.

"The Comparative Anatomy of Epicritic and Protopathic Sensation," by H. H. WOOLLARD, M.D., B.S. .. 544

"The Therapeutic Uses of Digitalis," by F. R. FRASER, M.D., F.R.C.P. .. 550

REPORTS OF CASES—

"Some Intracranial Complications of Otitis Media," by G. A. D. MCARTHUR, M.D., B.S. .. 558

"A Severe Case of Arsenical Poisoning," by H. W. GAULT and H. C. MALING .. 560

REVIEWS—

A Pocket Medical Formulary .. 561

Incompatibility in Prescribing .. 561

Individual Psychology .. 562

Protein Sensitization and Asthma .. 562

A Text Book of Surgery .. 562

LEADING ARTICLES—

The Basis of Clinical Knowledge .. 563

CURRENT COMMENT—

Gastrectomy in Gastric and Duodenal Ulcer .. 564

ABSTRACTS FROM CURRENT MEDICAL LITERATURE—

Pædiatrics .. 566

Orthopædic Surgery .. 567

BRITISH MEDICAL ASSOCIATION NEWS— PAGE.

Scientific .. 568

Medico-Political .. 568

Nominations and Elections .. 575

CORRESPONDENCE—

Research in Maternal Mortality .. 575

CONGRESS NOTES—

Australasian Medical Congress (British Medical Association) .. 575

CONGRESSES .. 575

UNIVERSITY INTELLIGENCE—

The University of Sydney .. 575

BOOKS RECEIVED .. 576

DIARY FOR THE MONTH .. 576

MEDICAL APPOINTMENTS .. 576

MEDICAL APPOINTMENTS VACANT, ETC. .. 576

MEDICAL APPOINTMENTS: IMPORTANT NOTICE 576

EDITORIAL NOTICES .. 576

THE COMPARATIVE ANATOMY OF EPICRITIC AND PROTOPATHIC SENSATION.[1]

By H. H. WOOLLARD, M.D., B.S. (Melbourne),
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I WAS very pleased indeed to be asked to deliver a lecture here this evening. The invitation reminded me that many of my old friends would be here and I would like to take this opportunity of expressing my gratitude to all my old teachers at the university and hospital. As an anatomist I owe my beginnings to Professor Berry. For my interest in medical science I remember Sir Henry Maudsley and Dr. Stawell with deep gratitude.

The problem I have selected for my lecture was first started in my mind by Dr. Stawell. It was he who impressed on me the significance of Head's dualistic theory and it was while I was his clinical assistant that the idea occurred to me that this problem might find its validity in comparative anatomy.

It is apparent from the papers and discussions at the recent Neurological Conference in London that any support which comparative anatomy can offer to the Head theory, is both necessary and welcome.

As is well known, the duality of our sensations was derived by Head from the study of the dissociation of cutaneous sensibility which followed a peripheral nerve lesion, and the events which occurred as nerve regeneration, proceeded and normal sensibility was reestablished. The more primitive component of the dual sensibility thus disclosed was called protopathic. Other names have been used for this, such as nociceptive by Sherrington, vital by Kappers, dyscritic by Sir John Parsons. This form is characterized as vague, crude, without local sign, radiating widely, aroused by painful stimuli such as prick and wide degrees of heat and cold and accompanied by affective tone. On the emissive side it issues in the total response of the whole organism or in Head's language, in the mass reflex. It is a system incapable of delicate gradation.

The other component, known as the gnostic or epicritic, is delicately graded, is capable of very definite localization, is discriminative, does not radiate or diffuse. On the emissive side it gives rise to movements which have been designated consummatory when the impulses come from surface receptors and anticipatory when they come from the exteroceptors. These reactions are not accompanied by an affective tone similar to that of the protopathic order. The feeling associated with these is of the æsthetic kind, the kind associated with successful achievement, so-called conative feeling. This does not crudely suffuse the whole organism as does that associated with the protopathic element.

[1] Read at a meeting of the Victorian Branch of the British Medical Association on September 5, 1928.

In his later work Head worked out the anatomy of these two orders of sensations in the spinal cord, *thalamus* and cortex. The completed hypothesis might be interpreted as representing a nervous system composed of three systems: (i) The autonomic, (ii) the protopathic, (iii) and the epicritic.

Some Difficulties of the Theory.

Naturally such a revolutionary conception could not pass unchallenged and recent criticism has been very severe. It has been contended by some that this dissociation described by Head does not occur at the periphery. To some of these criticisms Head himself has replied. The theory and observations are not without support from clinical observers and even from those who have performed similar experiments to Head's. This applies in particular to the work of Trotter and Morriston Davies. The observations of these surgeons are not widely different from those of Head himself and Head accepts their observations as being, so far as the facts go, in fair agreement with his own. Boring has criticized the results of Head. He performed an experiment on himself, producing a small area of anæsthesia in his forearm. Head has replied that the area was so small that it did not permit of any accurate observations. Moreover, Head was very scornful of the psychological acumen of this observer. Most recently that intrepid investigator and octogenarian, Schafer, has investigated the same problem in the same way. He cannot admit the theory of Head. He appears to have been unfortunate in his choice of nerve. The theory would be most persuasive if an adequate mechanism at the periphery could be found and analysed. Head assumed that there must be a punctate sensibility with special receptors for these two kinds of sensations.

In general we can recognize two kinds of receptors, one which terminates amongst the deeper epithelial cells as the terminals of a naked axis cylinder and the other a medullated fibre ending by arborization in some kind of specialized connective tissue capsule or forming terminal discs in relation to certain cells of the Malpighian layer which may be regarded as acting as neuro-epithelial cells.

It has long been recognized that there is not a sufficient number of end-organs of the second type to account for the epicritic sense. Waterston in his recent investigations has once more drawn attention to this fact. Further, he has pointed out that punctate sensation cannot be regarded as the rule, since the spots for heat and cold, previously mapped out, do not correspond when mapped on a subsequent occasion. Moreover, alteration of the normal state of the skin, such as blistering for instance, alters altogether the punctate nature of the sensibility.

Head assumed that there must be an earlier regeneration of the protopathic nerves after section of the nerve trunk. Stopford, though confirming the observations of Head, was inclined to look else-

where for the explanation of the dissociation, particularly in the earlier assertion of the functions of the *thalamus*. He suggested this more primitive and therefore more stable centre would naturally come into action earlier than the cortex after a peripheral injury. The differences in recovery have been explained by Pollock as due to nerve overlap.

Boeke and Heringa seized the opportunity of investigating the mode of reestablishment of peripheral nerve endings. Heringa unluckily shoved his hand through a window and cut his ulnar nerve. When recovery had reached a stage of sensibility which corresponded in the opinion of the neurologist with the state depicted by Head, small pieces were excised from the ulnar border of Heringa's hand and the nerve endings studied by the Bielschowsky method. Boeke's opinion was that all the endings regenerated simultaneously.

Certain areas of the body, such as the cornea and the *glans penis*, exhibit only the protopathic form of sensibility. It is true the cornea shows only the naked type of ending and fits in well enough with the theory, but the same cannot be said of the *glans*, for this seems to have all the usual variety of endings found in skin where both types of sensation are present.

Another difficulty arises from the anatomical distribution of the various types of ending. It is a well known observation that the mesentery of the cat contains an abundance of Pacinian corpuscles in a position where it is difficult to suggest that they can subserve any aspect of epicritic sensibility. Moreover, the work of Ränstrom is interesting in this connexion. As you know, the lower intercostal nerves swing round between the abdominal muscles in loops concave upwards. These loops are farther apart before they reach the outer border of the rectus. As they reach this border, they gradually approach one another and just before they enter the posterior aspect of the rectus sheath, they give off numerous branches to the extraperitoneal tissues. These form a plexus and in the endings of this plexus there is an abundance of organized endings, particularly of Pacinian corpuscles. Ränstrom took the opportunity of examining the sensation derived from this plexus in suitable hospital patients. The point he established was that only the sensation of pain was aroused, no matter what kind of stimulus was used. Thus there is a difficulty in associating any particular type of ending with a particular type of sensation.

These are important criticisms and it is not possible to answer them completely.

It may be that we cannot rigidly apply the law of specificity and adequate stimulus to all forms of cutaneous receptors. Though these aspects of sensation are fundamental, it is possible that they do not apply with the same force to the primitive form, as they do to the later and more highly organized exteroceptors for instance. The recent work of Adrian on peripheral afferent nerves is of some significance here. He brought precise proof to what has always been assumed, that sensory nerves, such as the depressor for instance, send a continuous series of impulses to the central nervous system. Every time the aortic valves open and close, an impulse passes up the depressor nerve. Further, he showed that the all or none law is universal in its application, even in the optic nerve; that the impulses of all afferent nerves for the most part have much the same frequency and no type of sensation appears to exhibit any characteristic grouping of the impulses. The type of nerve ending did, however, impose one difference and that was in the rate of adaptation. The more highly organized the ending, the slower was the rate of adaptation. This applied especially to a highly complicated end-organ like a neuro-muscular spindle. Pain receptors, on the other hand, were characterized by a very rapid rate of adaptation. There was a quick rise in the frequency which soon subsided. Adrian surmises that there must be appropriate arcs in the central nervous system which particularly respond to this type of summated stimulus. Moreover, and I think this important, a light stimulus of a pain nerve in man is felt as a contact. The same light stimulus in the frog, applied to a naked nerve ending, causes a burst of impulses which subside quickly. If the stimulus be increased to a degree which is felt as pain in man, the burst of impulses that follows, is of no greater frequency, but continues for a longer period, though not so long as those coming from a neuro-muscular spindle for instance. Hence it is possible to conclude, on the protopathic side at any rate, that other factors enter into the sensation experienced, factors depending not altogether on the specificity of the end-organ, but on frequency rate, on adaptation, on summation in particular arcs centrally.

Another factor I believe may be important: In some observations of my own I have obtained evidence that the same medullated nerve fibre by means of collaterals may bear several different kinds of end-organs. If this is so, it would increase the importance of the phenomena of interference and adaptation.

The theory perhaps implies that peripheral nerves might contain a special system for mediating protopathic impulses and Ränstrom claimed that they were subserved by non-medullated fibres. These results of Ränstrom have not been confirmed by other histologists and the results of physiological investigation, such as those of Adrian, show that the conduction of painful impulses does not resemble the behaviour of impulses carried by non-medullated nerve fibres. Brouwer appears to accept the results of Ränstrom and proceeds to identify the protopathic system with the autonomic system. It is closely related to the autonomic system, but to identify them is quite wrong I think.

Thus, so far as the peripheral apparatus is concerned, we are in an equivocal position and the results so far obtained are difficult to align with Head's theory.

There are also difficulties in the central mechanism. If the *thalamus* be the end station for

pain normally under control of the cortex, how is a patient able to speak about his pain when the *thalamus* is released from cortical control? Assuredly the speech centres do not lie in the *thalamus*. The only escape from this is to assume indirect connexions. And there is still doubt as to whether pain is represented in the cortex or not.

Evolutionary Objections.

All who have concerned themselves with this problem have appealed to evolution for support and for elucidation of their particular point of view. Head himself appealed to evolution. Trotter in his turn asked questions of evolution and got a different answer. Walshe considered the behaviour of the elementary nervous system and concluded there was no such thing as a protopathic animal, such as Head's theory demanded. Walshe assumed that Head's theory justified one in searching the animal kingdom for an animal whose sensations would be of the crude, vague, non-localized, all or nothing, overwhelmingly emotional type and that on the motor side it would exhibit only mass reflexes—violent flexions of the whole body, profuse sweating, evacuation of the bladder and so forth, all excepting the coitus reflex which has not the mass characters.

Even amongst the cœlenterates, the hydrozoa, for instance, it is possible with the appropriate stimulus to arouse movements delicately graded and finely adjusted.

I believe there are fallacies in this argument. It is not a question of a pure superimposition of epicritic sensibility on a kind that was purely protopathic, but rather the achievement at a higher level, both psychologically and anatomically, of a new synthesis which withdraws the epicritic elements from the protopathic and further developes them. In this synthesis the protopathic element is not left in its original state. Epicritic elements are withdrawn from it. Some of its aspects are suppressed, such as the irradiation and the absence of localization, for these would be harmful to a more highly graded type of behaviour. Other elements, biologically useful, would be preserved. Thus when the epicritic is segregated in man, it is not reasonable to suppose that what is left represents the actual behaviour of some lower animal. It merely tends in this direction.

The biogenetic or recapitulation law of development does not mean that because the human embryo at one stage possesses gills, there exists or did exist a fish like a human embryo.

Comparative Anatomy.

If we consider the anatomy of the nervous system of the lower vertebrates in order to test Head's theory, we should expect to find evidence of the segregation of epicritic and protopathic systems. The nervous system where the protopathic becomes subordinated to the epicritic, where the epicritic appears as a distinct element in the organization of the nervous system, is that of the reptile. And it would appear as if the theory of Head might have started from this type, for it gives a degree of intelligibility to its anatomy that no other theory could.

The skin of the reptile probably resembles that of the frog and would then be innervated by two kinds of endings. The most abundant and the one occupying exclusively large areas of skin, is the free naked ending type amidst the deeper cells. The other is the variety known as *macula tacta* in which a specialized ending occurs amongst epithelial cells which have the characters of neuro-epithelium. Even in the fish organized endings are present as neuro-muscular endings, but in these lower vertebrates the unorganized type is by far the more abundant.

Then the reptile is the first vertebrate in which definite posterior columns end in nuclei corresponding to the gracile and cuneate.

In the mid-brain we find a *ganglion isthmi*, the homologue of the medial geniculate body, and posterior colliculi. The medial geniculate body receives fibres from the lateral fillet and from the spino-bulbo-mesencephalic fibres. These latter correspond to the spino-thalamic tracts of man and are known in comparative anatomy as the Edinger fibre system, that is they are the protopathic system. It is interesting to observe that the lateral fillet exists before there is a cochlea.

In the front of the mid-brain, in the *tectum opticum*, we can distinguish a lateral geniculate body and an anterior quadrigeminal body also receiving Edinger fibres and optic fibres and functioning as a correlating system of some importance.

In the *thalamus* there can be distinguished a large medial nucleus receiving fibres from the *tectum* continuing the Edinger or protopathic system to this part of the *thalamus*. Also there appears for the first time a lateral thalamic nucleus which receives fibres corresponding to the mesial fillet, that is the epicritic system.

Most striking of all, fibres pass in what is called the lateral forebrain bundle to the surface of the forebrain. This is the first indication of that neocortex which will become the great glory of all the higher mammals, and it begins as the final receptive station for fibres from the *thalamus* which correspond to the epicritic system. The neocortex thus begins between the medial hippocampal and lateral pyriform portions of the archicortex as a discriminative organ.

The medial portion of the *thalamus* is connected by fibres to the nuclear mass corresponding to the basal ganglia.

On the emissive side we can distinguish in the cerebellum a new portion corresponding to the part which receives cortical fibres in mammals, and in the red nucleus the reptile is the first vertebrate in which a definite *nucleus parvo-cellularis* can be

distinguished. This is the portion which receives the superior peduncular fibres from the cerebellum.

In the *corpus striatum* a striate portion can be distinguished from the pallidal part.

This list of the distinctive features of the nervous system of the reptiles is by no means exhaustive, but it is clear that it does present us with an order of organization that is made intelligible, if we regard it as the stage in the evolution of the nervous system at which this great departure of epicritic from protopathic sensation occurs. It furnishes a very clear illustration of the fundamental validity of the theory of Head and it is sufficient to convince us that whatever modifications future research may make in this theory, its essentials are well grounded in biology. The work of Sherrington and of many others shows how little progress can be made in neurology unless we keep before our minds the necessity of interpreting the behaviour of the nervous system in terms of what is biologically useful.

Epicritic Systems.

Changes occur in the epicritic system in the later stages of the evolution of the nervous system. The posterior columns which carry the epicritic sensations, show a progressive increase as we pass up the vertebrate scale from the more primitive to the more highly organized. Head's work on this tract has been abundantly confirmed. The only criticism that has been passed on this, is the impossibility of a spinal tract subserving such a high psychological function as the discrimination of two points. We may agree that this is a synthesis beyond the capacity of the spinal cord.

The gracile and cuneate nuclei which can first be definitely distinguished in the reptile, exhibit in more highly organized vertebrates a definite lamination which we believe is characteristic of the centres of the epicritic system. The *neothalamus, id est* the lateral nucleus of the *thalamus,* grows in proportion with the epicritic system and again exhibits this tendency to lamination. The lamination has usually been interpreted as simply a means of gaining increased surface area. This is true, but it is also, I think, something more. It is the anatomical basis of localization, the physiological basis of gradation and the psychological basis of discrimination. Lamination does not occur in the centres of the protopathic system.

If we contrast the small beginnings of the cortex in the reptile with the neocortex of the mammal, we can appreciate in a kind of way what a powerful organ has been evolved for higher and higher syntheses out of the epicritic and discriminative sensations. It would be interesting at this point to correlate the work of Pawlow, Lashley and others with Head's analysis of the functions of the cortex. Both Pawlow and Lashley see the cortex as a system of analysers arranged around the receptive centres and diminish the importance of the association areas. Pawlow uses the word analyser to describe cortical function, a word practically synonymous with the use of discriminative by Head. Spearman's theory of intelligence is in harmony with the work of Head and it is interesting that Head's analysis of aphasia was based on tests of which Spearman remarked that they abundantly contained the ability to perceive the relations between things, intelligence being this very function. All these investigations depend on and in their turn illustrate that the neocortex is the organ for the analysis and synthesis of epicritic sensations. The work of Magnus has exalted the functions of the mid-brain and most investigators are agreed in relegating the instincts to subcortical areas. Basset was even able to induce purring in decerebrate cats, thus answering the criticism that only unpleasant emotions were aroused in animals deprived of their cortex.

The Fifth Nerve.

The anatomy of the fifth nerve is well known, but I would refer to it because it affords a most convincing illustration of the essential validity of Head's theory. The spinal tract of the fifth receives only protopathic impulses, contact, pain and temperature, the epicritic impulses being received in the chief sensory nucleus in the middle of the *pons.* The order of representation in the spinal tract is inverted, the ophthalmic portion is the lowest, reaching to the second cervical segment. Then follow the maxillary and finally the mandibular, the oral region being really the most anterior part of the animal. The principal sensory nucleus is the epicritic receptive centre and corresponds to the gracile and cuneate nuclei. In it can be distinguished the portions receiving epicritic sensibility from the three parts of the fifth nerve. After much controversy and searching the mesencephalic root is now recognized to be the source of the proprioceptive impulses from the muscles of mastication and thus belongs to the epicritic system. In lower vertebrates such as the reptile, there is abundant evidence that these spinal trigeminal fibres reach the medial nucleus of the *thalamus* and together with olfactory fibres form what Kappers has called the oral sense, and underlie such reflexes as sniffing and snuffling. They reach the same part of the *thalamus* as the protopathic Edinger system. Comparative anatomy shows an alteration in proportions of the two systems in the fifth as one ascends the animal scale.

The Optic System.

Sir John Parsons has attempted to see in the scotopic vision of the rods, functioning in low luminosity, extremely sensitive to movement, of poor definition, without colour, crude and vague, the protopathic order of vision. With the photopic vision of the cones comes precise definition with a full range of colour and this would represent the epicritic side.

For Sir John Parsons the difficulty of this hypothesis lies in the phenomena of peripheral vision of the retina. This shows the same phenomena as the

central parts, if the stimulus be strong enough and of sufficient duration. This is difficult if rods only are present at the periphery, as Parsons believes. This, however, is not the case. Cones, though scarcer, do extend right to the periphery and so the phenomena of peripheral vision can be understood. One other point is worthy of mention, namely, the number of intermediate neurones in the retina is small for rods, abundant for cones. This would furnish in part an anatomical basis for the higher discriminative possibilities of cone vision. The difficulty for me is that we have no evidence that the optic fibres coming from the rods are segregated into a special system and we do know that animals with only rods in the retina have a cortical visual area. Moreover, cones are present in reptiles, birds *et cetera*. It is of interest that the only sense represented in the cortex of birds is the visual sense.

Nevertheless in the behaviour of the mid-brain centres we get evidence of what happens to fibres of protopathic significance. The lateral geniculate body in the lower mammals shows division into two nuclei, a dorsal becoming more and more laminated and further differentiated in the centre by the development of a macular nucleus; and a ventral composed of smaller cells which show no lamination, thus resembling what we have postulated for the protopathic nuclei elsewhere. The ventral nucleus which is connected with reflex mid-brain centres, undergoes a progressive reduction in the higher members of the animal scale.

The superior *colliculus* receives in the lower members optic fibres, but the recent investigations of Brouwer have shown how few it receives in the higher members. In monkeys he says it is difficult to find many degenerated fibres in the superior *colliculus* after a lesion of the retina. It, too, falls away as the discriminative system becomes more and more potent.

Almost 100% of the fibres of the optic radiation take origin in the lateral geniculate body. What, then, of the pulvinar? Though traditionally believed to receive fibres of the optic tracts, Brouwer asserts that it does not. It may receive fibres which have been relayed in the lateral geniculate. It is said to be connected with the frontal cortex and particularly with the angular gyrus and may be regarded as a centre for the correlation of hand and eye. Its late development in evolution and its relation to the *neothalamus* all place it in the epicritic system. I suggest it may function for the perception of movement and a case published by Winckler of tumour of the *thalamus* bears this interpretation. In any case it cannot be regarded as a protopathic centre, as Riddoch suggests.

Visual fibres are, of course, the predominant epicritic system in the primates and in man and it is interesting to observe how it frees itself from all lower associations and becomes *par excellence* a cortical system of epicritic fibres. One other point is of interest, the righting reflexes investigated by Magnus which depend on visual stimuli, occur only in those animals which have binocular vision and are dependent on the cortex.

Cochlear and Vestibular Systems.

Briefly, the vestibular may be regarded as the protopathic and the cochlear as the epicritic system. The vestibular is almost wholly a brain-stem system and underlies so many of the Magnus reflexes. The detailed anatomy of these reflexes requires much more investigation, but there can be no doubt that they are predominantly related to the mid-brain.

The cochlear system only late in evolution disentangles itself from these vestibular components. Many features it retains which indicate its original fusion with the vestibular. I need not allude to the community of structure which characterizes their end organs. Cochlear fibres are still entangled peripherally with the saccular portion of the vestibular nerve. A lateral fillet is developed long before there is a cochlea and Winckler has shown that both vestibular and cochlear systems are intermingled in their mid-brain courses. The formation of an auditory radiation is a late achievement. All these facts show that the cochlear system has played a far inferior part to the visual system in primate evolution and its separation from the protopathic system is a comparatively recent event.

Cerebellum.

The cerebellum is an example of a predominantly epicritic system on the emissive side. The details of cerebellar morphology, the complex and intricate nature of which Elliot Smith has done so much to unravel, we need not discuss. Suffice it to say that we can distinguish a paleo-cerebellum and a neo-cerebellum. The whole cerebellum consists of: (i) an anterior lobe, (ii) a middle lobe which comprises so much of the human cerebellum, namely, the middle of the *vermis*, the whole of the upper and lower surfaces of the hemispheres and (iii) a posterior lobe including the *flocculus* and the *paraflocculus*. The anterior and the posterior lobes represent the paleo-cerebellum, the protopathic portion, and are related most peripherally to the vestibular system and then to the spino-cerebellar systems of Flechsig and Gowers. The neo-cerebellum or epicritic portion is related to the cerebrum and its development which becomes so predominant in the higher mammals, is accompanied by the development of the cerebro-pontine fibre system, the expansion of the *pons* and the growth of the inferior olive.

Just as the investigation of the functions of the *corpus striatum* has bred confusion beyond measure, so the same is true of the cerebellum. Hitherto it has been felt that most of the phenomena accompanying cerebellar defect are due to the release of other centres, that is, they are negative signs. There is some evidence that the tonic mid-brain reflexes gain in intensity, but lose in gradation when the cerebellum is out of action. (Holmes believes that there is a loss of postural tone due to the cerebellar

defect, but the recent experiments of Rademaaker do not confirm this.)

Comparative anatomy shows the inadequacy of the definition of the cerebellum as the head ganglion of the proprioceptive system. Rather is it an organ used by the cerebrum for the performance of motor coordinations depending on epicritic sensations.

The Protopathic System.

The old protopathic system, known to comparative neurologists as the Edinger fibre system, has several features of interest. The fact that it crosses almost immediately in the cord, seems reminiscent of the old segmental arrangement.

That it pursues its course in the brain-stem as a series of neurones making connexion with several lower reflex centres, explains several features. It explains many of the earlier difficulties in following this system to its ultimate destination. For degeneration experiments were necessarily confined to the neurones injured. In addition to several connexions in the brain-stem it finally reaches the *thalamus*. It is generally believed that it lies on the lateral side of the mesial fillet, the epicritic fibre system, and ends finally in the ventro-lateral part of the *thalamus* and then by another neurone reaches the medial nucleus of the *thalamus*. This, as far as I know, has not been actually demonstrated to be the case. In the reptiles the medial part of the *thalamus* is reached by a tecto-thalamic tract from the mid-brain.

The work of Coghill has an application here, for in studying the earliest reactions of the amphibian larva and correlating these with the anatomy of the nervous system, he has shown that such reactions as turning away, the coil reflex and the swimming reflex, are based on reflex arcs whose character is not that of the hypothetical reflex arc of physiology, namely, the shortest possible connexion between the afferent and efferent neurones, but is, as a matter of fact, mediated by tracts composed in the cord and brain-stem of many neurones. These reactions are of the nature of mass movements.

The most interesting point of this system is its relation to emissive centres. The medial nucleus of the *thalamus* is the oldest part of the *thalamus* and appears to be the final end station of the Edinger protopathic system. Kappers and others believe that it has fibre connexions with the cortex. In the exhaustive investigation of the *thalamus*, made by Sachs, he was unable to demonstrate the existence of such a connexion and I think we may believe in the present state of knowledge that it has no cortical connexions. It is, of course, connected with efferent olfactory systems, such as the mamillo-thalamic tract or bundle of Vicq d'Azyr. This would indirectly relate the *thalamus* to the archicortex, a part of the cortex which becomes insignificant from the displacement due to the growth of the discriminative neocortex.

The other connexion of interest is the fact that the *corpus striatum* receives all its thalamic fibres from the old *thalamus*, the anterior and medial nuclei, that is to say the end station of the protopathic system radiates not to the cortex but to the basal ganglia.

Corpus Striatum.

Some confusion has been introduced into thinking about the *corpus striatum* owing to the fact that comparative anatomists have introduced such terms as *neostriatum, archistriatum* and *palæo-striatum,* as though these parts of the *corpus striatum* succeeded each other in evolution. The *neostriatum* represents the caudate nucleus and the *putamen.* The *archistriatum* becomes the amygdaloid nucleus and this we may not consider since it retains its olfactory connexions. The *paleostriatum* is the *globus pallidus.* If we leave aside these comparative terms for the moment, we can regard the caudate and the *putamen* as the receptive part of the *corpus striatum* and the *globus pallidus* as the efferent mechanism. It is well established that only striopallidal fibres arise in the *striatum.* In this way the *corpus striatum* conforms to the general plan of nerve centres, namely, a small-celled receptive area, the *striatum* (caudate and *putamen*) and a large-celled efferent portion, the *globus pallidus.* The *globus pallidus* is connected by means of the *ansa lenticularis* with the *hypothalamus* which we may regard as the autonomic centre, and with the red nucleus which we know to be the centre for regulating muscle tone and the centre for the tonic labyrinth reflexes and the body righting reflexes on the body. The other tonic and righting reflexes are situated either in the mid-brain or more caudally. Thus this efferent system brings the *corpus striatum* into relationship with the motor coordination centres of the mid-brain.

I would suggest that the caudate nucleus and *putamen* furnish an association area for the protopathic sensations that radiate from the medial and anterior nucleus of the *thalamus* and through the *pallidum* these exert their influence on the mid-brain motor centres.

We have seen that it receives fibres only from the old *thalamus.* Despite the results of numerous observers there is no good ground for believing that it receives or sends fibres to the cortex. Moreover, it differs from the epicritic centres and resembles the protopathic in having no regular arrangement of its cells. The caudate and *putamen* are made of small cells arranged in no regular manner. It is interesting that the anatomical relation of the medial *thalamus* and the *corpus striatum* exemplify another feature of the neural organization. A new epicritic centre always appears in the middle of the old protopathic mass, compare the *neopallium* and *archipallium,* neocerebellum and palæo-cerebellum, and, in the present instance, the *neothalamus* developes between the old *thalamus* and the *corpus striatum.* Physiological experiment has hitherto failed to elicit any phenomena which we may say depend on the *corpus striatum.* Kinnear Wilson suggests that its rôle in man is small and believes only two symptoms, both negative, and therefore dependent on the release of lower centres, arise through disease of the striatum, namely, rigidity and tremor.

If we start from the assumption, which is not without anatomical foundation, that the *striatum* represents the association area from which the mass reflexes start, the question presents itself as to what symptoms we should expect when this system is disordered in an animal predominantly epicritic. It is to be noted that it is only in the higher primates that the *striatum* begins to show relative and absolute reduction. In seeking for an answer to our question we must bear in mind that the protopathic mass reflex will not be left in its original state when the epicritic elements are removed from it. Some aspects will be suppressed and some will be utilized depending on their biological usefulness.

I believe that an analysis of how an animal responds to a dangerous situation, for instance, might show that the behaviour consists of two parts—an initial stage of immobility and then the release of the mass movement of aggression or flight or whatever is the usual behaviour habit of the animal. Immobility will depend on rigidity of the flexors and extensors and is due to centres lower than the *striatum*. As we have already seen, the protopathic system proceeds by many short neurones connected with many mid-brain centres. Perhaps in this we might see the neural basis of the rigidity and its biological significance as the initial part of a mass reflex. The transformation of this initial stage into flight *et cetera* is a function of the *striatum* itself.

The difficulty of investigating this hypothesis is twofold. Pathological cases are unsuitable for the lesions are never precise and we do not know what to attribute to the mid-brain postural centres and what to the autonomic activities of the *hypothalamus*. And so far experimental investigation of the *striatum* has yielded only negative results. Nevertheless, I think the idea may be worth following up, for the *corpus striatum* is likely to be a more difficult problem than the cerebellum, an organ whose functions are still obscure.

It has been my intention to place before you briefly some observations from comparative anatomy which seem to support Head's theory. Head's theory, so fundamental in neurology and psychology, seems to fit the facts of comparative neurology so beautifully, that it is impossible for me to believe that it is inherently unsound.

THE THERAPEUTIC USES OF DIGITALIS.[1]

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IN presenting the therapeutic uses of digitalis it is not necessary to show how the principles underlying its action in patients have been gradually established. The record of the work done in various countries makes a fascinating chapter in the history of medicine, but to understand the indications for the use of the drug it is necessary to know only the results of all this work and it is hardly necessary to present the steps by which the results have been attained.

As is often the case in the history of a drug, the first record of the use of digitalis consists of notes of cases treated by a shrewd physician who learned of "a remedy for the dropsy" that was made up according to a family receipt. He tried it carefully and was an accurate observer, noting the type of case that responded successfully and not omitting just as careful notes of the failures. All honour to Withering, of Birmingham, who published the account of his observations in 1785.[1] That we have advanced since then in our skill in the use of the drug I hope to show and there can be no doubt that we now know much of the principles underlying its use.

The principles of its action have naturally been worked out more completely in animals than in man and I shall describe these first and then show to what extent they hold for therapeutic purposes in man.

Action in Animals.

Inhibition.

If the mammalian heart *in situ* in the animal body is examined and instrumental records of its action made while under the influence of larger doses, much larger in comparison than the therapeutic doses used in man, an effect is seen that is described as inhibition. There is a slowing of the rate of beating and there is an increase in the degree of relaxation of the ventricle in diastole. This slowing and this increased diastolic relaxation are removed if the animal is given a full dose of atropine and are therefore due to vagus stimulation. These actions are illustrated in the work of Cushny[2] [3] who has been largely responsible for our present knowledge of the pharmacology of digitalis.

Now if a frog's heart is treated in the same way, atropine does not remove the inhibition. Further, a mammalian heart perfused for a long time shows the same action as the frog's heart and the inhibition is not removed by atropine.

Another inhibitory effect that is seen in these experiments, is the impairment of the conduction of the impulse from the auricle to the ventricle, so that in some cases the ventricular rate is slowed by interference with the impulses to it from the auricle. This inhibitory effect also is removed by atropine in the healthy mammalian heart, but is not removed in the frog's heart nor completely in the mammalian heart with auricular fibrillation.

Ventricular Contraction.

Besides these inhibitory effects, the experiments on animal hearts show that there is an increased contraction of the ventricle, the systole being more complete. This effect is in no case removed by atropine.

[1] Being a lecture delivered at a special post-graduate course arranged by the Melbourne Permanent Committee for Post-Graduate work on August 10, 1928.

As would be expected from an increased diastolic relaxation and an increased systolic contraction, there is an increased output of blood with each beat of the heart. This increased output is the result of the inhibitory effects and of the increase in the ventricular systole. The inhibitory effects are partly due to vagus effects, since they are removed to some extent by atropine and partly independent of the vagus and due to a direct effect on the heart muscle. The increased systole of the ventricle is a direct effect on the heart muscle.

Irritability.

Before I leave the animal heart there is yet another action of importance I must mention. Large doses of the drug increase the irritability of the muscle of both the auricle and the ventricle by direct action on the muscle.

Blood Pressure.

In experiments with animals it is found that a rise in blood pressure occurs and although this is partly due to the increased output of the heart, it is in part also due to an effect on the blood vessels of the body causing constriction. Gottlieb and Magnus[4] especially have studied this effect and have shown that it is due to a direct action on the peripheral vessels and still occurs when the nerves supplying the part are divided. This constrictor action varies in different parts of the body and is most evident in the splanchnic area, so that there may be constriction there with passive dilatation of the vessels of the leg. Varying doses cause varying effects and one observer[5] has shown that, while large doses cause generalized constriction in cats and rabbits, smaller doses cause dilatation of the renal vessels and constriction of the vessels to the other viscera and increased general systemic blood pressure.

Principles of Action in Man.

In Normal Man.

In human beings who are apparently in normal health in whom the drug is pushed until toxic symptoms give evidence that the full effect has been obtained, there is as a rule no slowing of the rate of the heart.[6] In a few cases, however, in which the rate of the heart is normally more variable than usual, slowing of the heart does occur. Slowing is sometimes seen when the toxic symptoms are severe, but this slowing can be of no therapeutic value.

Increase in the diastolic relaxation of the ventricle has never been satisfactorily demonstrated by any of the methods possible in clinical investigations, but these are not comparable with the methods available in animal experiments.

Lengthening of the conduction time between the auricles and the ventricles occurs constantly and can be demonstrated by polygraphic and electrocardiographic records.

As in animals, so in man this inhibitory effect can be abolished by the administration of atropine and is due, at least partly, to the vagus mechanism.

In Man with Heart Failure.

Effect on the Pace-maker.—If the effect on patients with heart failure and normal mechanism of the heart beat is examined in the same way, slowing of the whole heart does occur when a raised rate is present. This is the action commonly seen in persons with rapid pulse, dyspnœa and œdema.

Effect on Conduction.

As in normal man, so in man with heart failure there is an increase in the conduction time which is removed by the injection of atropine. This effect of atropine is, however, not constant, for in some cases neither the slowing nor the increase in the conduction time is entirely abolished. In man, therefore, as in animals, the inhibitory effects of slowing of the pace-maker and lengthening of the conduction time are the results both of vagus stimulation and of a direct action on the tissues that is independent of the vagus.

Effect on the Ventricles.

That increased contraction of the ventricle occurs in man has so far not been clearly proved; there is, however, considerable evidence in support of such an action. Many patients with symptoms of heart failure feel relieved when under treatment, although slowing of the heart beat has not occurred and indeed may not be desirable and no other demonstrable proof of beneficial action can be brought forward. There is, however, proof of a direct effect on contraction of the ventricular muscle, afforded by the study of the electrocardiograms of patients under treatment. The *T* wave which is usually positive before treatment, becomes negative during treatment and returns to the original form after the administration is stopped.[7] That this action is a beneficial one there is no proof, but it is proof of an effect on the contraction of the ventricular muscle and as it is not removed by atropine, it is proof of a direct effect on the contraction of the ventricular muscle. It is also evidence and usually the first evidence obtainable that the drug is acting. Cohn has recently demonstrated by means of cinematograph records of the outline of the ventricles as shown by X rays that the excursion of the edge of the ventricles is increased by digitalis.

Effect on Blood Pressure.

The effect on blood pressure, on which pharmacologists insist and which would be a valuable guide to the clinical use of the drug, is unfortunately of little or no use. The human body is so highly developed, perhaps to accommodate for changes in posture and especially for the erect posture, that the automatic control of the blood pressure is too efficient to allow of such changes in the pressure as would constitute practical guides. It is impossible to demonstrate changes in the blood pressure of normal people under the influence of therapeutic doses of the drug. In many cases of heart failure the pulse pressure is small and increases under treatment by a fall in the diastolic

pressure, the systolic sometimes rising, sometimes remaining steady and sometimes falling.[8] There are, however, patients with heart failure associated with low blood pressure in whom a high pressure might be expected and in such circumstances a rise does result from digitalis treatment, the rise occurring in both diastolic and systolic pressures. In no case should any reading of the blood pressure be regarded as a contraindication to digitalis administration.

Diuretic Effect.

The therapeutic action originally described by Withering was for the relief of dropsy and this is undoubtedly its most striking success, but it does not relieve all cases of dropsy and it is doubtful if it has any true diuretic action. In normal man there is no increase in the output of urine, but when œdema is associated with heart failure as a result of the heart failure diuresis does occur. It is generally accepted, therefore, that what action the drug has in improving the output of urine is dependent on the general improvement in the circulation and in particular on the improvement in the circulation through the kidneys.

Gastro-Intestinal and Nervous Effects.

In addition to these effects on the heart and circulation there are effects referable to the nervous system and the gastro-intestinal tract. Headache, drowsiness, depression, nausea, vomiting and purgation may be caused. The picture is often very similar to that of sea-sickness and the patient lies in bed and does not like to be disturbed for anything — a thoroughly miserable picture. These so-called toxic effects are mainly central in origin[9] and animals with their gastro-intestinal tracts entirely removed go through the muscular movements of vomiting with doses of the drug that are comparable with those that produce the toxic effects in man. The vomiting and diarrhœa are sometimes partly due to direct irritation of the stomach and intestines and their onset depends to some extent on the particular preparation employed. The important point is that the maximum desirable effect is obtained by a dose very little short of that which produces the toxic effects and if a maximum effect is required there is but a small margin and great care is necessary.

Primary Therapeutic Actions.

The essential actions of digitalis in man available for therapeutic purposes are, therefore, three in number:

1. In cases of heart failure with rapid heart rate the pace-maker is slowed by vagus stimulation or by direct action on cardiac structures or by both actions.

2. In all cases there is a prolongation of the auriculo-ventricular time by vagal stimulation and direct action on the cardiac structures. This may result in heart block and may therefore slow the ventricles.

3. There is a direct effect on the ventricular musculature which probably results in increased force or magnitude of the contraction.

Secondary Effects.

The secondary effects due to one or more of these actions are often more obvious than the direct effects, but what they are must depend in any one case on the cause of the heart failure and on other existing conditions. By the primary actions there is an improved blood flow to all parts of the body. The blood is more fully oxygenated and gets rid of its carbon dioxide more efficiently. The cerebral centres are properly nourished and receive the necessary supply of oxygen. The heart itself receives an efficient circulation and kidney functions improve, œdema disappears and the organs of digestion are restored to functional efficiency.

Absorption and Elimination.

Before the actual therapeutic practices are described it is necessary to consider the absorption and elimination of the drug.

Absorption.

In general, digitalis in the form of the tincture is absorbed rapidly after oral administration. In some instances absorption seems to be faulty and in a number of cases this appears to be due to the unhealthy condition of the patient's digestive tract and in others it may well be due to variations in the drug. A good tincture is entirely absorbed in six hours[10] and by means of the alterations in the *T* wave of the electrocardiogram it has been shown that the action of the drug may be seen in two to four hours.[11] In cases of persistent vomiting due to heart failure it may be given *per rectum* and appears to be absorbed just as readily as when given by the mouth.

Elimination.

Persistence of action as manifest in the state of the *T* wave may be noted for as long as three weeks after the administration has been stopped. There is much evidence to show that it rapidly leaves the blood stream and is found in the tissues, including the heart and is but slowly eliminated from them,[12] so that if administered at a greater rate than it is destroyed or eliminated, an increasing intensity of action will result. This accounts for the so-called cumulative action. The rate of elimination has been very roughly estimated at about 1·3 cubic centimetres (twenty-two minims) of the tincture a day,[13] so that the fact that patients can continue taking 1·25 to 1·75 cubic centimetres (twenty to thirty minims) a day indefinitely without any toxic symptoms arising is easy of comprehension.

Dosage.

It has been noted that if digitalis is administered at about the rate of 3·5 cubic centimetres (one drachm) of the tincture a day, there is a remarkable constancy in the total amount that must be given before full therapeutic or minor toxic effects are obtained. Eggleston[15] has shown that, allowing

for the variations in body weight, the total amount required is remarkably constant and is equal to 0·33 cubic centimetre of the tincture or 0·033 gramme of the powdered leaf for each kilogram of body weight. Thus for a patient weighing 63·5 kilograms (ten stone or 140 pounds) the total required will be 21 cubic centimetres or roughly five drachms. He recommends that in cases of urgency the total should be divided and given in the following doses:

One-third to one-half of the total in the first dose.

One-fifth to one-quarter of the total in the second dose six hours later.

One-eighth to one-sixth of the total in the third dose six hours after the second.

By this means a full effect is obtained in twelve to twenty-four hours and a definite effect in five to six hours.

It is often difficult to determine the body weight in urgent circumstances and it is also difficult to ascertain the true value of the preparation used. But a rough calculation gives the required dosage approximately, if preparations obtained from one of the firms of chemists of good repute are employed.

In the cases I have treated in this way I used to give 75% of the calculated amount in the three doses, to be on the safe side in the approximation, but recently I have adopted the rule in most cases of giving 5·25 cubic centimetres (a drachm and a half) of the tincture in the first dose, 3·5 cubic centimetres (one drachm) in the second six hours later and 1·75 cubic centimetres (half a drachm) in the third six hours after the second.

In deciding on the dosage and rate of administration to be employed in any case, it must be remembered that the maximum therapeutic effects are obtained with amounts of the drug that are very close to those producing undesirable or toxic effects.

In view of the fact that the drug is partially fixed to the cardiac tissues and but slowly eliminated, at about the rate of, roughly, 1·2 cubic centimetres of the tincture a day, it is clear that if given at the rate of 3·5 cubic centimetres a day in three or four divided doses, the full effects will not be obtained until from five to ten days. That is the dosage commonly adopted in severe but less urgent cases. Doses less than 1·75 cubic centimetres a day can usually be borne continuously without toxic symptoms arising, but without a full effect being produced and such doses are used to prevent the onset of severe heart failure.

The rapidity of administration that will be selected in any case, will depend on the urgency of the symptoms and on the likelihood of toxic phenomena developing. Severe heart failure in a young patient with auricular fibrillation and a rapid ventricular rate of 140 to 180 is a suitable condition for the rapid method. In heart failure with auricular fibrillation and a slow ventricular rate, so that the presence of some degree of organic interference with auriculo-ventricular conduction is probable, a cautious administration is advisable. When an acute infection of the myocardium is present, as in active rheumatic infection and infective endocarditis, toxic phenomena, such as numerous extra-systoles, commonly develope early in the administration and the rapid method is not advisable. If digitalis bodies in any form have been previously given within a week or ten days, the slower methods are preferable, so that the administration can be stopped at the first signs of toxic effects, at which time there can be only a single dose, a comparatively small fraction of the total dose, still to be absorbed. Patients with heart failure with normal rhythm seldom present the extreme urgency of symptoms that necessitates the use of the rapid method.

Therapeutic Uses in Heart Failure.

If the three primary actions on the heart are kept clearly in mind, we can deduce which of them can be of value in the different disturbances of the heart that produce heart failure and which of them may be useless or even harmful. If in addition we consider the evidence as to the dosage and the rates of absorption and elimination, it becomes possible to regulate the treatment with remarkable accuracy and even to foretell the results in many cases. In other cases by some departure from the expected results light is thrown on the condition of the heart.

It is in the treatment of heart failure or its prevention that digitalis has its therapeutic uses. Many clinicians consider that its use is limited to those cases in which the rate of ventricular beating is slowed. Others confine its use to heart failure due to auricular fibrillation in which it has its most dramatic effect. From a consideration of its actions there would appear to be no good reason for such limitations and there would appear to be reason to expect beneficial results in practically every case of myocardial insufficiency.

This expectation is borne out by clinical experience and the effects obtained and the limitations to its usefulness in the different types of heart failure will be briefly described.

Heart Failure Associated with Cardiac Irregularities.

The treatment of heart failure with digitalis is particularly successful in cases with disturbances of the cardiac rhythm and especially when the disturbance is due to auricular fibrillation.

Auricular Fibrillation.

In auricular fibrillation the ventricle is stimulated frequently and at irregular intervals. The ventricle is thus contracting at various stages of rest and of filling. The contractions result in varying output of blood and many are so ineffectual as not only to fail to give a wave at the radial artery in the wrist, but even to fail to open the aortic valves. No inhibitory action on the sino-auricular node which normally acts as the pacemaker, can have any effect in controlling the ventricular delirium, but the other actions of digitalis on the heart, the inhibition of conduction from

auricle to ventricle and the direct effect on ventricular contraction, will be of service. The more nearly the heart failure is the result of the chaotic ventricular rhythm alone, the more successful should the action of the drug be in restoring an efficient circulation.

If, however, severe valvular disease and myocardial changes are present, the ultimate state of efficiency to which treatment can bring the patient, is less good. The following is a case that illustrates this point.

The patient was a young girl with a history of chorea and later of rheumatic fever, with signs of mitral stenosis and auricular fibrillation and suffering from severe heart failure. The effect of the drug was dramatic and she was fully digitalized in twelve hours, but she had been under observation for some time and we knew her before the auricular fibrillation commenced. At that time her activities were extremely limited and signs of heart failure appeared on the least exertion. Treatment with digitalis restored to the patient the very limited efficiency she enjoyed before the auricular fibrillation commenced. She required 0·9 cubic centimetre (fifteen minims) of the tincture daily to maintain this optimum condition.

In long standing cases where changes have occurred in other organs, where the liver is enlarged and firm, where there is evidence of gastric, renal and pulmonary changes, the reduction in ventricular rate is not accompanied by the same striking improvement in the condition of the patient. There is considerable improvement, but the full effect of the therapy is only gradually developed and full doses of the drug must be continued for a long time before the greatest possible improvement is attained.

Sometimes cases are seen with heart failure and auricular fibrillation without rapidity of pulse or of ventricular rate. In such a case further slowing is not likely to be advantageous and no effect as the result of inhibition of conduction is to be expected and rapid administration is to be avoided. Here gradual improvement does result, however, and it is probable that this is the effect of the action on the ventricular contraction.

There are cases in which the result of digitalis treatment is not so satisfactory. It is obvious that the extent to which the heart muscle can respond to the drug, will be the more limited the more extensive the myocardial damage, whether due to degeneration or inflammation, independently of the presence or absence of valvular damage.

Thus in a patient aged fifty-eight the response was good as regards the slowing of the ventricular rate and the disappearance of much œdema, but the general response was not striking. Ventricular extra-systoles were numerous when the slowing was at its maximum and further slowing was difficult to obtain. There were no signs of valvular disease, but the numerous extra-systoles developing under the influence of the drug are characteristic of certain cases of myocardial damage. In such cases the treatment by digitalis is less satisfactory and the best results must not be expected. An extreme degree of this type is seen when there is severe disease of the coronary arteries and in such it is common to find that very little response can be obtained and that if full doses are used, more harm than good follows.

When in addition to heart failure and auricular fibrillation there is an active infection, as is seen in rheumatic disease with carditis and in ulcerative endocarditis, the treatment with digitalis is peculiarly ineffective. Even if slowing results, there is little general improvement in the condition of heart failure and toxic phenomena appear readily and earlier in the therapy than might be expected. Frequently slowing of the ventricular rate cannot be obtained before toxic phenomena appear.

In treating patients with auricular fibrillation the ventricular rate is a good guide to the stage of digitalization. The ventricular rate is controlled almost solely by the amount of digitalis present in the absence of an organic lesion of the auriculo-ventricular conducting apparatus. As long as the auricular disorder continues, the inhibition of conduction must be maintained that the patient's circulation may be as efficient as possible. It is necessary, therefore, that when the heart failure has been reduced as far as possible, a relapse must be prevented by a continuance of the inhibition. The patient must continue to take just sufficient digitalis to maintain the rate of its optimum. If a larger daily dose is necessary for this than the eliminating processes can balance, an increasing effect will be produced. Daily doses of 0·9 cubic centimetre (fifteen minims) and sometimes of 1·75 cubic centimetres (thirty minims) of the tincture can be taken without any increasing effect, but when 2·6 or 3·5 cubic centimetres (forty-five minims or a drachm) are necessary, it is advisable to allow a day or more without the drug at some regular interval.

In heart failure associated with other irregularities the effect of digitalis is not so good and certainly not so striking.

Premature Contractions.

Extra-systoles or premature contractions can be caused in several ways and have no clear relation to heart failure. The treatment of heart failure accompanied by extra-systoles should be regulated, therefore, by considerations other than their presence. It is found that they sometimes disappear during the improvement under digitalis. In other cases they become more numerous or appear for the first time and as these patients are usually those that do not respond well, the increase in the frequency of extra-systoles may be taken as indicative of a limited response and as a sign that the full beneficial effect has been obtained.

Heart Block.

Digitalis can produce heart block and to increase the degree of block in a case of incomplete heart block is rarely indicated. In cases of complete block with heart failure no effect on the rhythm can result by further inhibition of conduction, but in such cases improvement in the general condition can be effected as a result probably of the direct effect on the ventricular muscle.

Auricular Flutter.

In auricular flutter the symptoms may be distressing even when the ventricular rate is not greatly raised, but as a rule simple reduction of ventricular rate by digitalis inhibition of conduction affords relief. The most efficacious treatment is to push the digitalis until auricular fibrillation results, when on the digitalis being stopped the normal rhythm is sometimes restored or the fibrillation continues and the ventricular rate can be controlled in the usual way.

Paroxysmal Tachycardia.

Paroxysmal tachycardia may be the result of auricular fibrillation or of auricular flutter, when it must be treated as in these disturbances. In other cases it is due to the establishing of an ectopic focus as pace-maker, either in the auricle or in the ventricle. Heart failure results if it continues for long, but digitalis is remarkably powerless in altering this rhythm and as long as the rhythm continues, the heart failure progresses. Digitalis is, however, of some value in the cases that show signs of progressing heart failure.

Heart Failure Associated with Normal Rhythm.

When we turn to cases of heart failure with normal rhythm and consider what effects digitalis can have, we have to remember that in such cases the ventricular rate and hence the pulse rate depend on the sino-auricular node as pace-maker and that an inhibition of conduction can have no effect on the ventricular rate unless actual block is produced. We must also recall that in man digitalis may not and usually does not slow the pace-maker when a rapid rate, œdema *et cetera* are absent and that slowing of the rate must not be looked for as an essential action. As a matter of fact we do not find slowing when factors that are responsible for the increased rate other than heart failure are present. Further, we may expect some action on the contraction of the ventricular muscle, but such an action is difficult to ascertain in man and may be concluded to be present only from its effects on the circulation generally.

Mitral Disease and Dilatation.

Heart failure with rapid heart, œdema, cyanosis and dyspnœa with normal rhythm, such as is seen with mitral disease, responds well. The effect is not so rapid nor so striking as in auricular fibrillation and the dramatic slowing of the ventricular rate by inhibition of conduction is absent. The effect, however, is more permanent, the constant administration of digitalis to control the ventricular rate not being required.

Aortic Valve Disease.

The presence of disease of the aortic valve in addition in no way alters the indications, as it frequently alters but little the clinical picture of heart failure. Patients with extensive aortic valve disease with hypertrophy of the left ventricle may respond by slowing and slight subjective improvement, but in such cases the possible improvement seems to be very limited. When there is dilatation with evidence of mitral regurgitation and a clinical picture more resembling that seen in mitral disease, the œdema, cyanosis and venous congestion responds well to the drug, but the improvement cannot go further than the limited circulatory efficiency determined by the aortic valve lesion and the state of the myocardium. No benefit is obtained by pushing the drug to its full effects in the pure aortic valve disease and some instances of sudden death, a contingency that is always to be expected in these patients, have been ascribed to the digitalis the patients were receiving at the time. Aortic valve disease is no contraindication to the use of digitalis, but the advanced myocardial disease that is usually present and often actively advancing, is an indication for cautious administration.

Active Endocarditis.

A limitation to the use of digitalis is seen also in active rheumatic carditis and of ulcerative endocarditis. The slowing is difficult to effect and if effected by pushing the drug it is accompanied by discomfort and toxic phenomena. Those cases of active infective carditis and of severe myocarditis may be regarded as similar to the case of carcinoma that the surgeon will not operate on. A time comes when the knife or digitalis can effect nothing but harm.

Arterio-sclerotic Myocardial Degeneration.

Myocardial degeneration associated with sclerosis of the coronary arteries may be associated with heart failure brought on by overexertion or by intercurrent illness. Response to rest is slow and unsatisfactory. Digitalis is of much benefit. Such cases may be associated with low systolic and diastolic blood pressures or with high pressures and with all the other evidences of arterio-sclerosis and hypertension. In the former conditions both systolic and diastolic pressures may rise, in the latter both pressures usually fall.

Patients with heart failure with severe myocardial degeneration respond badly. The degree of myocardial change is probably the principal factor determining the response that may be obtained in all patients with heart failure and it is obvious that if the myocardial insufficiency is so severe that heart failure developes without the presence of any added factors, such as abnormal rhythm, overexertion or acute infection, the response that can be obtained must be very limited.

In chronic bronchitis and in renal disorders with rapid pulse, œdema and dyspnœa, a myocardial factor is frequently present. The response in such cases, especially in older patients, is good and the results are often satisfactory, although relapses of the bronchitis or renal condition are common and in consequence a recurrence of the heart failure is also common.

Acute Infectious Diseases.

Many statements have been made as to the inefficiency of digitalis in the circulatory failures

associated with acute infectious diseases. No one can deny this, but have we any right to expect it? To what extent is the circulatory failure seen in these conditions due to the heart and to what extent to vasomotor disturbance? If the latter predominates, digitalis is hardly the drug that would be selected and there is much evidence to show that vasomotor disturbances dominate the picture. The rapid pulse rate is frequently taken as a gauge of the heart failure. A rapid pulse rate in pneumonia, for example, is present without any signs of heart failure; it is concomitant of the fever, a result of the toxin acting somewhere and effecting the pacemaker. Digitalis does not essentially slow the pacemaker, except in the rapid rate of failure. Digitalis can hardly be expected, therefore, to slow the rapid heart rate in acute infections and the presence or absence of change in rate must not be taken as a criterion of its activity.

Electrocardiographic studies in pneumonia show that the lengthening of conduction time and the change in the *T* wave that are the most constant indications available of the action in man, occur just the same in pneumonia and just as early in the administration.[14] In auricular fibrillation complicating pneumonia the ventricular rate can be controlled just as in non-febrile conditions. The indication for digitalis in fevers, such as pneumonia, is the same as in non-febrile affections, that is heart failure, and its limitations are the same, but we must be clear as to what indications of its beneficial action we can expect. It will not slow the rapid rate of fever and it will not control the symptoms of circulatory failure that are due to vasomotor disturbances. I believe in using it in cases of pneumonia from the outset, although it is difficult to give proof of its value. The right ventricle is working against an increased resistance and when it fails, it is not only because of the changes in the muscle due to intoxication, but a mechanical factor is present. The direct action of the drug on the ventricular muscle to increase the force of contraction should be of value in these circumstances. Its administration from the outset is justifiable further because of the occasional patient who developes auricular fibrillation or flutter at the critical period. If the patient is not well digitalized when this happens, a serious heart failure results and urgent medication by intravenous injection may be necessary. To get maximum effects then without overdoing it requires very careful regulation, if possible by instrumental records.

Thyreo-toxic Heart.

There is one other type of heart failure with normal mechanism where digitalis is disappointing. It has no control over the rapid rate in exophthalmic goître. Just as in acute fevers, there is probably a cause other than heart failure for the rapid rate and a slowing of the pace-maker ought not to be expected. Even in auricular fibrillation which not infrequently occurs in the thyreo-toxic heart, the ventricular rate cannot always be slowed to the usual extent; coupling frequently developes before the expected response occurs, just as in cases of severe myocardial and coronary disease. In many patients, however, the response is as good as when it is not associated with thyreo-toxic conditions and it seems probable that the determining factor in the degree of response is the extent of myocardial damage or intoxication.

Active Principles and Preparations.

Many workers have attempted to isolate from digitalis the active principles, in an endeavour to obtain those giving the most useful effects and omitting those that cause the toxic phenomena. The result is that there have been isolated a large number of bodies known by a variety of names chosen by the whim of the investigator. Many of them are not pure chemical bodies and differ from others with the same or another name in the proportion of the principles present.

According to Dixon's summary[16] the main active principles are:

1. *Digitoxin.*—Digitoxin is a glucoside, insoluble in water, but soluble in alcohol and chloroform. "Nativelle's crystalized Digitaline" is the most commonly used form of digitoxin, but it is not quite pure.

2. *Digitalin.*—Digitalin is a glucoside, feebly soluble in water, soluble in alcohol and slightly in chloroform.

3. *Digitonin.*—Digitonin is a saponin body, with no action of use in therapeutics. It is, however, by virtue of this body that digitoxin and digitalin are soluble in water and appear in the infusion.

Of the two important active principles digitoxin is much the stronger and may be used in daily doses up to one milligramme or one sixty-fourth of a grain, while digitalin may be given in doses up to two milligrammes for repeated administration, with a maximum daily dose of sixteen milligrammes. By oral administration it is not clear that the toxic symptoms are any less or later with these principles than with the official preparations.

By intramuscular injection they are attended by considerable pain and it is so considerable in subcutaneous administration as to preclude their use in this way. There is less objection to their use intravenously, but great care must be taken not to inject into the tissues.

Several preparations of these bodies have been introduced such as "Digalen" and "Digitalene," but they have no advantages over the official preparations by the mouth and are just as unsuitable as digitoxin for injections.

"Digipuratum" is yet another which is said to contain all the active principles freed from saponin and organic material. It is soluble in weak alkali and consists of a mixture of tannic acid compounds of the glucosides. It is standardized to contain a fixed amount of digitoxin and has proved on examination of supplies in various forms and ages to be remarkably constant. The bodies causing direct irritation of the stomach are absent, but the vomiting due to the central action is present and

on the whole it causes less gastric disturbance than the powdered leaves. It is also made up in solution in capsules ready for intramuscular and intravenous injection, so that one cubic centimetre is equivalent to 0·1 gramme of the powder which is put up in tablet form. It would be a most valuable preparation if it were not about ten times as expensive as the official preparations.

Many physicians prefer the infusion, but even with standardized leaves the varying solubility of digitoxin in water makes the strength of the infusion very variable. The tincture is more constant and, if kept carefully, has been shown scarcely to lose in activity at the end of two years, while the infusion deteriorates rapidly, unless kept in hermetically sealed vessels. Mixtures containing the tincture diluted with water, however, lose their activity rapidly and cannot be relied upon for a longer period than two weeks after the mixture is made up.

In the last few years the use of the powdered leaf has become widespread and it is probably the best, as it is the most stable, but care must be taken that it is obtained from a reputable firm that uses standardized preparations only.

Other Bodies of the Digitalis Group.

Besides digitalis there are other plants that have a similar action on the heart. It is not proposed to give details of these preparations and their actions. Only two of them are used at all commonly and of the two squills is, as a rule, used as an expectorant and to a less extent as a diuretic.

The other, strophanthus, is used frequently and needs consideration.

The tincture of strophanthus given by the mouth has found a place in therapeutics in the belief that in certain cases the stomach will not tolerate digitalis preparations, but can retain the tincture of strophanthus and that it has less vasomotor action and can, therefore, be used with greater advantage in cases associated with high blood pressure and with aortic valve disease. The action is due to the active principle, strophanthin. The action of strophanthin is qualitatively the same as of digitoxin, but the vasomotor constrictor action is much weaker. It has been shown by Hatcher and Bailey[17] that strophanthin is absorbed irregularly and variably from the digestive tract and tincture of strophanthus is much less used now than formerly for oral administration, largely because of this uncertainty of absorption.

It is, however, for its convenience for intravenous and intramuscular administration that strophanthin is important.

It is soluble in water, is but slightly irritating and can be isolated as a chemically pure body of comparatively constant strength.

There are some forty to fifty different botanical species of strophanthus and from one of them, *Strophanthus gratus*, crystalline strophanthin is obtained. An identical crystalline body can be isolated from another plant called ouabaio and to identify the crystalline from the amorphous body the name ouabain is used as a synonym for crystalline strophanthin. It is with this pure body, the crystalline ouabain, that much of the recent pharmacological work on the action of the digitalis series of bodies has been done.

To obtain a digitalis action rapidly the intravenous injection of strophanthin would appear to be an ideal method. The action appears in the course of a few minutes. There is only one objection to this method of treatment and that is the danger of overdosing, in view of the fact that the full therapeutic dose is very close to the toxic dose.

If a patient has been having digitalis or strophanthin which is still bound to the body tissues and exerting an action, a dose of strophanthin by intravenous injection that would ordinarily have only a beneficial effect, may have a severe toxic or even fatal result. When repeated ordinary doses of digitalis are given by the mouth, the onset of the toxic state is gradual and as a rule the patient by vomiting limits the absorption; but when a dose of strophanthin has been given intravenously, no such natural control exists. Safe doses mean an effect short of the maximum beneficial; multiple small doses would have little advantage over oral administration of the tincture of digitalis, unless other factors, such as severe gastro-intestinal disease, are present.

A single intravenous dose of strophanthin followed by oral administration of digitalis is a most useful method in urgent cases, although the recently developed method of giving digitalis by the Eggleston "rapid method" makes the occasions for strophanthin still fewer and obviates to some extent the trouble due to possible previous administration of digitalis bodies.

The dose of amorphous strophanthin is about double that of the crystalline ouabain which has a maximum daily dose of one milligramme or one sixty-fourth of a grain.

Toxic Effects.

Since the amount of digitalis bodies necessary to give a maximum beneficial effect is close to the amount producing toxic effects and since the appearance of minor toxic phenomena is the best indication that the maximum beneficial result has been obtained, it is important to keep in mind what toxic phenomena may be expected to appear.

The indications for stopping the administration for a few days at least are the onset of mental depression, headache and drowsiness, followed by anorexia, nausea and vomiting.

Occasionally nausea developes before the depression and drowsiness, especially in the presence of acute infection. Diarrhœa is less common than vomiting, but also occurs. A reduction in the output of urine is a valuable sign that is often overlooked and requires careful observation to differentiate in cases of œdema from the cessation of the beneficial diuresis. The charting of fluid intake and output is useful in making this differentiation.

Slowing of the ventricular rate below fifty should always be regarded as an indication for reduction of dose or for stopping the administration for a few days, but each patient must be considered individually, as the optimum rate varies considerably from patient to patient. The development of extrasystoles or an increase in the number of extrasystoles and the appearance of coupled rhythm, especially when auricular fibrillation is present, are indications for caution. The appearance of heart block, apart from the moderate prolongation of auriculo-ventricular conduction time, that is a constant effect of digitalis, is usually a late phenomenon following the appearance of mental depression and nausea, but may be the first indication of undesirable results. This is particularly common in conditions in which there is some damage to the auriculo-ventricular conducting apparatus, and may be taken as indicative of the presence of such a lesion.

It is probable that all cases of heart failure may be improved by digitalis. The extent to which improvement can result, depends on the cause of the heart failure and on a variety of factors that accompany the lesions and interfere with the development of the maximum effect by the appearance of undesirable phenomena. To get the best results, not only a close study of the case is necessary, but also a knowledge of the particular preparation of digitalis employed. This can be obtained only by using one or two sound preparations, such as tincture of digitalis and strophanthin in all cases and so learning their possibilities and limitations in as great a variety of conditions as possible.

References.

(1) Withering: "An Account of Foxglove and Some of Its Medical Uses, with Practical Remarks on Dropsy and Other Diseases," 1785.

(2) A. R. Cushny: "On the Action of Substances of the Digitalis Series on the Circulation in Mammals," *Journal of Experimental Medicine*, 1897, Volume II, page 233.

(3) A. R. Cushny: "Digitalis in Auricular Fibrillation," *Journal of Pharmacology and Experimental Therapeutics*, 1918, Volume XI, page 103.

(4) Gottlieb and Magnus: *"Ueber die Gefässwirkung der Körper der Digitalis-gruppe," Archiv für Experimentelle Pathologie und Pharmakologie*, 1911, *Band* LXV, *Seite* 367.

(5) K. Fahrenkamp: *"Ueber die verschiedene Beeinflüssung der Gefässgebiete durch Digitoxin," Archiv für Experimentelle Pathologie und Pharmakologie*, 1911, *Band* LXV, *Seite* 367.

(6) A. E. Cohn and F. R. Fraser: "Certain Effects of Digitalis on the Heart," "Proceedings of the Thirteenth International Congress of Medicine," London, 1913.

(7) A. E. Cohn, F. R. Fraser and R. A. Jamieson: "The Influence of Digitalis on the T-wave of the Human Electrocardiogram," *Journal of Experimental Medicine*, 1915, Volume XXI, page 593.

(8) C. Eggleston: "The Influence of Large Doses of Digitalis and Digitoxin on the Blood Pressure in Man," *Journal of the American Medical Association*, 1917, Volume LXIX, page 951.

(9) R. A. Hatcher and C. Eggleston: "The Emetic Action of the Digitalis Bodies," *Journal of Pharmacology and Experimental Therapy*, 1912, Volume IV, page 113.

(10) C. Eggleston: "Some Newer Concepts in Digitalis Therapy," *American Journal of the Medical Sciences*, 1920, Volume CLX, page 625.

(11) H. E. B. Pardee: "Rate of Absorption of Digitalis from Gastro-Intestinal Tract," *Journal of the American Medical Association*, 1920, Volume LXXV, page 1258.

(12) R. A. Hatcher and C. Eggleston: "Studies in Elimination of Certain Digitalis Bodies from the Animal Organism," *Journal of Pharmacology and Experimental Therapy*, 1919, Volume XII, page 405.

(13) H. E. B. Pardee: "Notes on Digitalis Medication," *Journal of the American Medical Association*, 1919, Volume LXXIII, 1822.

(14) R. A. Jamieson: "The Action of Lethal Doses of Strophanthin in Normal Animals and in Animals Infected with Pneumonia," *Journal of Experimental Medicine*, 1915, Volume XXII, page 629.

(15) C. Eggleston: "Administration of Digitalis by 'Eggleston Method'," *Journal of the American Medical Association*, 1920, Volume LXXIV, page 733.

(16) W. E. Dixon: "Digitalis Preparations Employed in Medicine," *Quarterly Journal of Medicine*, 1912, Volume V, page 297.

(17) R. A. Hatcher and H. C. Bailey: "The Clinical Uses of Strophanthin," *Journal of the American Medical Association*, Volume LV, page 1697.

Reports of Cases.

SOME INTRACRANIAL COMPLICATIONS OF OTITIS MEDIA.

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IN comparison with their frequency in otological clinics abroad, intracranial complications of *otitis media* are rarely met with in this country. This is partly on account of the smaller scattered population, but also because of the higher hygienic standard of the people who as a result do not regard an otorrhœa with the same complacency as do the hospital classes abroad. Complications arising from a neglected otorrhœa are thus largely eliminated and we see mainly those secondary to an acute or subacute otitis.

The following small series of consecutive cases is of interest on account of the variety of conditions met with.

Lateral Sinus Thrombosis with an Attempt at Spontaneous Healing.

Cases have been recorded in which the lateral sinus was represented by a thin fibrous cord. This has been regarded as the result of the natural cure of a thrombus which, instead of breaking down, has undergone organization and fibrosis. The following case probably represents a stage in this process, at operation the sinus having been found filled with granulation tissue.

C.C., a male, aged thirteen years, was admitted on September 7, 1926, complaining of profuse discharge from one ear of fourteen days' duration. He stated that several months before the ear had discharged for a week. On examination he looked "toxic" and there was a profuse discharge from the left ear. The temperature was 39·3° C. (102·8° F.) and pulse 130. While being prepared for operation, he complained of feeling sick and shivery, but no actual rigor was observed.

At operation a large perisinus abscess was opened, the *dura* over the sinus being covered with œdematous granulations. The sinus itself was not opened and the boy was returned to the ward for further observation.

Three days later he was looking and feeling well, the temperature having fallen to normal. On the following day he had a rigor and the temperature rose to 39·4° C. (103° F.). The lateral sinus was therefore split open. No blood or thrombus was present, but the lumen was obliterated by pale granulations which were adherent to the wall. The outer wall of the sinus was excised till free bleeding occurred at either end. At the torcular end a few flakes of pus appeared with the first gush of blood. Nothing further was found to account for the return of his

toxic symptoms. The jugular vein which was full of fluid blood, was ligated and the patient made an uninterrupted recovery.

Benign Serous Meningitis.

W. L., a male, aged thirty-seven years, was admitted on September 15, 1926. He complained of pain and discharge from the left ear of five days' duration. Previous to that he had had tonsillitis. On the day of admission he became giddy and vomited several times. On examination, pus was seen to be leaking through a small perforation in the lower part of the drumhead. There was a rotatory nystagmus of the first degree on looking to the right. There was no past-pointing or Rombergism. Deafness, of middle ear type, was present to a moderate degree. The perforation in the drumhead was enlarged. This relieved the giddiness, but the discharge persisted. Three weeks later the mastoid was opened, following which the meatal discharge cleared up for a few days. The improvement, however, was not maintained, the meatal discharge recommencing and becoming more profuse.

A month later he suddenly became acutely ill. He complained of very acute pain in the back and had a slight rigor and vomited, the temperature rising to 39·4° C. (103° F.). On examination Kernig's sign was present on both sides and there was some stiffness of the neck on flexion. The mastoid cavity was reopened and found full of healthy granulations. The *dura* of the middle and posterior fossæ was exposed and found to be normal. The opening in the drumhead was enlarged. The Eustachian tube and *additus* were obstructed. Lumbar puncture yielded several cubic centimetres of definitely cloudy fluid, not under increased pressure. Examination of this fluid revealed numerous polymorphonuclear leucocytes, but no microorganisms either in smear or culture. The patient was definitely improved within two days. Though the temperature was still 39·4° C. (103° F.), he was free from headache. Kernig's sign and neck stiffness had disappeared. His only complaint was of pain in the back, which he said was excruciating at times. A second lumbar puncture yielded thirty cubic centimetres of clear fluid under increased pressure. This also contained polymorphonuclear leucocytes, but no microorganisms. Following this the pain in the back and the temperature gradually subsided and the patient made a slow, but gradual, recovery. The perforation in the drumhead was kept wide open.

Following the use of suction from the meatus and catheterization of the Eustachian tube the discharge gradually disappeared. The perforation in the drumhead then healed, but when the patient was last seen, the hearing in this ear was greatly reduced, the spoken voice being heard at a distance of only two feet.

Acute Diffuse Suppurative Labyrinthitis.

Mrs. W., aged sixty-four years, was admitted on October 6, 1926. The patient stated that six months previously she had had influenza which was followed by an attack of pain in the left ear. One night something burst in the ear and in the morning she found a little blood-stained discharge on the pillow. No further discharge occurred, but since then she had suffered from noises in the ear and a sense of fullness was constantly present. Two months later she had a sudden attack of giddiness and vomited. The latter lasted all day only, but the giddiness has persisted till the present time. She says she walks like a drunken man and has a feeling as if she were going to fall over to the left.

On examination the fundus of the left auditory meatus contained epithelial *débris*, the drumhead was thickened and injected and there was some sagging of the postero-superior wall of the meatus. She walked with a slight staggering gait, but there was no falling or past-pointing. There was complete deafness in the affected ear and the caloric reaction was absent. The dangerous nature of her affection was pointed out to her and the question of draining her labyrinth was discussed. She declined operation and left the hospital unrelieved. A fortnight later she suddenly developed meningitis from which she died within thirty-six hours.

Cerebral (Temporo-sphenoidal) Abscess.

F.S., a male, aged twenty-one years, was admitted on November 8, 1926. The patient had had a discharging ear for about eight years, but as he had no parents and his relatives seldom saw him, an accurate history was hard to obtain. Apparently a fortnight before admission he felt unwell and did not go to work. A week later he saw a doctor who found a discharging ear, but no sign of any intracranial complication. On the morning of the day of admission, he suddenly developed a severe headache and vomited.

On admission the temperature was 38·3° C. (101° F.) and the pulse 66. He was very drowsy and answered questions slowly. The head was somewhat retracted and Kernig's sign was present on both sides. There was no swelling of the optic discs. The left auditory meatus contained foul-smelling pus. The drumhead was almost totally destroyed and the inner tympanic wall was covered with granulations.

A radical mastoid operation was performed. The *tegmen antri* was necrotic and likewise an area of *dura mater* in contact with it. A cavity in the temporo-sphenoidal lobe was opened and about eight cubic centimetres (two fluid drachms) of very foul-smelling pus were evacuated.

Lumbar puncture yielded cloudy fluid which was under increased pressure, and which on examination was found to contain pus cells, but no microorganisms. The patient improved for a few days and became much brighter, though he still had some head retraction, but gradually he became drowsy again and his pulse rate became slower. The temporo-sphenoidal lobe was again explored and about sixty cubic centimetres (two fluid ounces) of very foul pus were evacuated from a larger cavity. Following this the pulse rate rose from 56 to 140. At each change of drainage tube a gush of pus escaped from the cavity, but the patient gradually became comatose and died on November 23, 1926, signs of right-sided hemiplegia occurring a few days before death.

At autopsy the end of the drainage tube was seen lying in a large firm-walled abscess cavity. The whole of the temporo-sphenoidal lobe was soft and necrotic and the lateral ventricle was full of purulent fluid. Evidently the abscess had been latent for some time and symptoms had arisen only as a result of the development of a terminal encephalitis.

Meningitic Neuro-Labyrinthitis.

The term meningitic labyrinthitis is used to denote a labyrinthitis which is secondary to a lepto-meningitis, in contradistinction to the more usual form which is secondary to an *otitis media*. Fraser and Dickie, having investigated this condition, came to the following conclusions: Meningitic neuro-labyrinthitis is a frequent cause of deafness and deaf-mutism. Deafness due to epidemic cerebro-spinal meningitis is certainly due to meningitic neuro-labyrinthitis. Measles and pneumonia may also be followed by meningitis and secondary neuro-labyrinthitis. In acquired syphilis and mumps lepto-meningitis is of common occurrence and is associated with inner ear deafness which is probably to be explained by neuritis or neuro-labyrinthitis (no microscopical examination as yet). Certain cases of deafness after influenza and osteomyelitis may also be of meningitic origin.

The original source of infection may be the respiratory tract, parotid gland, genital organs, long bones or elsewhere. A blood infection (septicæmia) probably in all cases forms the connecting link between the primary disease and the onset of meningitis.

Meningitic neuro-labyrinthitis is usually, but by no means always, bilateral. The onset is usually sudden. Irritative symptoms, such as tinnitus and giddiness, are often present, but may not be observed owing to the mental condition (coma) of the patient.

The infection usually passes along the subarachnoid space from the base into the internal auditory meatus and then along the nerves and vessels to the labyrinth. The resulting deafness is as a rule complete and permanent in the ear (or ears) affected. Vestibular symptoms (loss of balancing and waddling gait) pass off rapidly in adults, but in young children they may last as long as one year.

The following case is unique in that the labyrinthitis was secondary to an otitic meningitis and not to a direct infection of the labyrinth *vid* the fenestra or external semicircular canal.

N.D., a male, aged ten years, was admitted on December 21, 1927. A year before he had had a very bad attack of mumps, but his mother was certain that no deafness followed in either ear. Three weeks before admission he began to have pain off and on in the left ear and occasionally missed a day at school. Four days before admission he had several attacks of vomiting, but was better on the following day. Two days later he felt tired and languid and was put to bed.

He was first seen in a busy out-patient clinic, when it was noticed that he looked ill and his temperature was found to be 38·6° C. (101·6° F.). The left drumhead was found to be injected and bulging, but no further examination was made at that time. At midday the left drumhead was opened under ethyl chloride anæsthesia and a quantity of pus was evacuated. When the boy recovered from the anæsthetic, he was able to walk upstairs to the ward, but in the early part of the afternoon he vomited frequently. His father was with him at 4 p.m. and at that time his hearing was unimpaired. Soon afterwards the ward sister had difficulty in making him hear and when the father returned at 8 p.m., he found that the boy was completely deaf and was speaking in a shout.

On examination next morning the boy was obviously totally deaf and spoke in a definitely raised voice. On the left side the meatus contained pus and he was tender on pressure over the mastoid, but nothing abnormal was detected on the right side. He lay in bed with no characteristic posture. There was a rotatory nystagmus to the left; its amplitude increased greatly on any movement, but was slight when he was lying still. He had complete loss of equilibrium and could not stand unsupported, but he did not fall in any particular direction. On returning to bed he vomited slightly and lay in any position in which he was placed. He had some neck stiffness and Kernig's sign was present to a slight degree on both sides. There was nothing abnormal in his reflexes and the optic discs were normal. He was quite bright and alert mentally.

A Schwartze operation was performed on the left mastoid. The mastoid process was of diploic type, the bone being very soft and everywhere riddled with pus. A large area of the *dura mater* of the middle and posterior fossæ was exposed for the purpose of examination, but was found normal. About ten cubic centimetres of cerebrospinal fluid were then withdrawn by lumbar puncture. The fluid was slightly opalescent, not under increased tension and on examination contained numerous polymorphonuclear leucocytes and pneumococci. On the second day after operation the nystagmus was found to have disappeared, but he suddenly developed aphasia and spoke in a slurred jumble which no one could understand.

Neck stiffness and Kernig's sign were still present and his temperature was 38·3° C. (101° F.). He appeared to be suffering from severe headache, was very irritable and cried out when touched. Under anæsthesia forty cubic centimetres of slightly opalescent fluid under greatly increased pressure were withdrawn by lumbar puncture. A cold caloric test, performed on the right ear while the patient was under the anæsthetic, did not produce any conjugate deviation.

Three days later it was noticed that there was some weakness of the right side of the face and that he was not using his right arm. There was also loss of the superficial abdominal reflexes and there was an extensor plantar response on that side. For several days he remained in an irritable condition. Then another lumbar puncture was performed, but only a few cubic centimetres of cloudy fluid were obtained. He then began to improve rapidly, so that ten days after admission the temperature, which had been between 37·7° to 38·3° C. (100° to 101° F.), had fallen to normal. He suddenly recovered his speech and the paresis of the right side disappeared. For a time he still had a slight Kernig sign on each side. On leaving his bed he was definitely ataxic for several days and for about a month walked with a characteristic waddling gait. When last seen he was still totally deaf and there was no response to caloric stimulation on either side.

Acute Mastoiditis, with Perisinus and Extradural Abscess.

R. T., a female, aged seventeen years, was admitted on March 13, 1928. The patient complained of pain on and off in the left ear for six months, with discharge from the ear for a fortnight. On examination there was a profuse meatal discharge with mastoid tenderness and a large fluctuant swelling about midway between the mastoid process and the external occipital protuberance.

A Schwartze mastoid operation was performed on the following day. After the incision was made, a pair of forceps was passed backwards under the periosteum till the fluctuant swelling was reached and a quantity of pus evacuated. After the mastoid was opened, a fistula was found in the sinus plate and when the latter was removed, a large perisinus abscess was exposed, the wall of the sinus being covered with healthy granulations. On removal of bone in a posterior direction a large extradural abscess was discovered which connected with the subperiosteal abscess through a hiatus in the bone in the region of the asterion. The *dura* was covered with healthy granulations and was exposed till normal *dura* was reached. Recovery was uneventful.

Reference.

J. S. Fraser and J. K. Milne Dickie: "Meningitic Neuro-Labyrinthitis," *Proceedings of the Royal Society of Medicine* (Section of Otology), January 16, 1920, page 23.

A SEVERE CASE OF ARSENICAL POISONING.

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A NAVAL rating, O.M., *ætatis* twenty-one years, was admitted to Flinders Naval Hospital on January 10, 1928, with an indurated ulcer on the prepuce after coitus about five weeks previously. Spirochætes could not be demonstrated and the Wassermann test yielded no reaction on January 11, 1928, but it was considered advisable that he should have a course of "Novarsenobillon." The sore was treated with iodoform and saline solution dressing and healed in a fortnight. The patient had had a course of six "Novarsenobillon" injections about twelve months previously without any ill effects.

After two injections of 0·45 gramme of "Novarsenobillon" and one 0·6 gramme "Novarsenobillon," the latter being on January 24, 1928, an arsenical rash was noted on January 27, 1928, and treatment was discontinued. The rash started as a generalized papulo-erythematous condition; it developed rapidly into general dermatitis, which was cracked and weeping on February 3, 1928. There was considerable adenitis and later suppuration took place in both axillæ and both groins. On February 5, 1928, the skin was dry, wrinkled, scaly, pigmented. The eyelids and face generally and the hands were much swollen. At this time, though a net was over the patient and he was constantly supervised, his ears were flyblown on two occasions.

On February 7, 1928, his temperature rose to 40·3° C. (104·6° F.), the patient developed bronchopneumonia and became very ill.

On February 8, 1928, severe diarrhœa and abdominal pain commenced and lasted till about February 18. At this time the outlook was very black. There was more or less general sepsis, with discharging glands, pneumonia and enteritis.

On February 18, 1928, the skin is noted as peeling very much. His skin improved slowly after this. During the next month he had another attack of pneumonia with rusty sputum and a high temperature.

On March 26, 1928, there was gross œdema of the left thigh and leg with pain in the groin. Iliac thrombosis

had supervened. His temperature was always 38·3° or 38·9° C. (101° or 102° F.) in the evening. This œdema lasted for two months, but has now practically disappeared.

On April 2, 1928, foot drop was noted in the left foot. Arsenical neuritis was present with absent knee jerk. From this time on continuous slow improvement was manifest. The skin gradually healed, but remained darkly pigmented all over his body. The face peeled completely, leaving a "schoolgirl complexion."

On May 28, 1928, he was covered with scaly patches of rash, especially on hands, elbows and legs. This rash lasted about ten days. He was now getting about and putting on weight fast; he had lost about 25·2 kilograms (four stone) during his illness.

On June 21, 1928, he caught a cold and his face became very swollen, painful and tender over the antra and frontal sinus. Presumably this was due to a mild attack of sinusitis which fortunately subsided.

On June 28, 1928, the patient left for sick leave. He is dark brown and has slight foot drop in the left foot, otherwise he is in very fair condition.

The patient remained very cheerful throughout his tedious and severe illness. The Wassermann test again yielded no reaction recently. Treatment was on general lines. Sodium thiosulphate, prepared for intravenous injection, was not obtainable in Melbourne. We were doubtful of the purity of the photographic salt and the previous experience of Surgeon Commander Carr, to whom we are indebted for permission to publish this case, is that it is of doubtful efficacy in dermatitis, though undeniably useful in jaundice caused by arsenical poisoning.

Reviews.

A POCKET MEDICAL FORMULARY.

THE fact that "The New Pocket Medical Formulary," by Dr. W. E. Fitch has reached its fifth edition would seem to imply that it fills some real or imagined want which is very difficult to comprehend.[1] The bulk of the book consists of a wearisome series of prescriptions for the various diseases of humanity, arranged in alphabetical order. The latest edition, unfortunately, contains many new formulæ and a new section entitled "The Physicians' Interpreter" "which, it is hoped, will aid the physician in interpreting and translating French, German and Italian into English." As far as the French language is concerned, the translations are certainly not accurate. The bulk of the book is devoted to a multiplicity of prescriptions, generally speaking of no particular merit. The practitioner who needs this book, is certainly in need of further education. The prescriptions display every imaginable fault. Thus Latin and English are combined; for example, "Ext. Opii aqueous." Alkalis are combined with acids, bismuth subnitrate with magnesium carbonate and sodium bicarbonate. The nominative, genitive and accusative cases are hopelessly mixed. Thus: "℞ Massa ferri carbonas; ℞ Potassii ferri tartras and ℞ Liquor physiologicus." Egregious polypharmacy obtrudes itself, seven and eight ingredients being not uncommon. Honey is measured by weight instead of by volume. One fluid ounce is taken as equivalent to 30 cubic centimetres and two fluid ounces as equal to 59 cubic centimetres. A weird mixture contains belladonna leaves, hyoscyamus leaves, strammonium leaves, extract of opium, tobacco and water, with the instruction: "Ft. Sol." Another gem is "pilulæ dividenda." Again: "One powder, well diluted, three times a day." We wonder how this powder is to be diluted and with what! Examples of carelessness or ignorance in the prescriptions could be multiplied indefinitely. The fact that the prescriptions naturally contain preparations of the United States Pharmacopœia and not of the British Pharmacopœia adds to the confusion. The therapeutical application of drugs is in many instances fantastical. Thus, for the hæmorrhagic diathesis we find recommended a mixture of digitalis, ergot and krameria and another one of digitalis, ergot and ipecacuanha. Could credulity further go? The internal administration of cocaine for migraine is equally deplorable. The administration of nitrohydrochloric acid or perchloride of iron, with hydrochloric acid for oxaluria would be utterly futile. The hypodermic exhibition of whisky or brandy is not to be recommended, if any other appropriate remedy be available, on account of the severe pain caused by either of them. Even more objectionable is the hypodermic injection of amyl nitrite in alcohol recommended in the book. Inhalation of amyl nitrite is preferable. In surgical shock and chloroform narcosis, mentioned as indications for its use, the blood pressure is perilously low and would be still further lowered by the use of this drug. It is absurd to state that in strychnine poisoning all objects look green. It is a great pity that so much time and space have been wasted in compiling the prescriptions, over two thousand in number, which encumber the book. Other parts of the work include formulæ for fluid foods; diet lists; a differential chart of eruptive contagious diseases; tables of differential diagnosis; poisons and antidotes; fractures, dislocations and sprains; obstetrical tables; tables of apothecaries' and metric system of weights and measures. The differential diagnosis of poliomyelitis from polioneuritis is given. What the latter disorder is, no information is vouchsafed. Is the author thinking of polyneuritis? The book contains over five hundred pages, but nowhere could any special merit be discovered.

[1] "The New Pocket Medical Formulary with an Appendix," by William Edward Fitch, M.D.; Fifth Edition, Revised and Enlarged; 1928. Philadelphia: Crown 8vo., pp. 510. Price: $3.00 net.

INCOMPATIBILITY IN PRESCRIBING.

DR. MUKHERJI'S little volume, dealing exhaustively with the very difficult subject of incompatibility in prescriptions, is an excellent work, worthy of being in the library of practitioners of medicine.[1] The subject is thoroughly dealt with and reasons carefully explained. Chemical and physical incompatibility are gone into, as well as physiological incompatibility or antagonism. A very complete table of incompatibilities is included and a long series of exercises in incompatibility is given with carefully explained answers. It is well pointed out that chemical incompatibility may sometimes be prevented by a suitable dilution of one of the drugs before adding it to the other ingredients or by attention to the order of mixing the

[1] "Incompatibility in Prescriptions," by Santosh Kumar Mukherji, M.B.; 1928. Calcutta: Rai Saheb B. N. Mukherji and Son. Crown 8vo., pp. 130.

ingredients in a prescription. A very complete list is given of explosive or inflammable combinations. Erythrol tetranitrate and mannitol hexanitrate will explode on percussion. Nitroglycerine in strong alcoholic solution may explode when shaken or agitated; a 1% solution is safe, but, if this preparation be further diluted with water and allowed to stand, an oily substance is deposited which is explosive. If *liquor trinitrini* be spilled, it should be destroyed with caustic potash to prevent accidents. Hypophosphites, picric acid and picrates when rubbed in a mortar or heated dry may explode. Explosion may be due to rapid chemical action (oxidation or reduction) between oxidizing and reducing agents. A most comprehensive list is given and examples quoted of disasters following breaches of these principles. Potassium chlorate may explode if triturated with calcium hypophosphite or with charcoal, sugar or tannic acid; or sulphur with calcium chloride; or chromic acid with glycerine. Sawdust has been set on fire by having nitric acid spilled on it. Explosion has resulted from a mixture of potassium permanganate, alcohol and water. Spirit of nitrous ether, mixed with any substance containing tannin, may explode owing to the formation of gaseous compounds of nitrogen. Many other instances are given and the whole subject is admirably treated. A few errors occur; thus liniment of turpentine is not acid, as stated, but is alkaline from the presence of potassium hydroxide. The liniment of turpentine and acetic acid is acid and was probably intended in the text. *Liquor strychninæ* also is not now acid, but is neutral. *Liquor ethyl nitritis* is stated to be sometimes acid, but it should not be so according to pharmacopœial requirements.

INDIVIDUAL PSYCHOLOGY.

IN "Understanding Human Nature" Alfred Adler attempts to acquaint the general public with the fundamentals of individual psychology, to show how the mistaken behaviour of an individual affects the harmony of society and to teach the individual how to recognize his own mistakes and put himself right with communal life.[1]

In discussing the soul the author says that it is difficult to define. It is something which arises from an hereditary substance which functions both psychically and physically. Only movable living organisms can have a soul, the strongly rooted ones have no necessity for one. Its development is conditioned entirely by social influences. From earliest childhood there is an ever present goal-effort in all of us, there are always the realities of life to overcome and there is always deference to the claims of society to be considered. The resultant of these forces is the soul.

Character on the other hand is the quality and nature of an individual's approach to the environment in which he moves. It is the behaviour pattern according to which his striving for significance is elaborated in the terms of his social feeling. According to the author heredity counts for little in the production of character, environment being the main factor and any character traits common to the members of the same family are not inherited, but are acquired from the other members of the family. This statement is totally at variance with the experience of workers in this country and ignores all the theories of the breeders of domestic animals.

As the individual is influenced so much by his *κόσμος*, the author discusses the elements in the development of the cosmic picture. Thus such subjects as perception, memory, imagination, the play of children, empathy and others are discussed at length. The old psychology is discarded absolutely in favour of the new or individual psychology in which all psychic phenomena can be considered as preparations for a definite goal. Two great tendencies dominate all psychic phenomena, namely, the social feeling and the individual striving for power and domination. This the reader will recognize as the time-worn complex theory of the psychopathologists with the *libido* being power lust, instead of a sexual one. A discussion of the equality of man and woman includes the information that it is only tradition that makes woman inferior to man and that women break away from the galling chains of this inequality idea by becoming mannish women, *garçonnes* or nuns. Coeducation of the sexes is the remedy suggested to overcome the idea of sexual inequality. So many subjects are discussed in separate short sections and chapters that the size of the publication gives no idea of the extent of the ground covered by the author.

The power seeking idea permeates throughout, all the problems being solved on the same lines.

It is extraordinary that such an important part of the human make up as the instincts has been practically ignored in this book. Their inclusion would certainly weaken the author's non-inheritable idea of character. There is no index to the book, although a table of contents gives the heading of each section. It is not a book that can be taken up at the end of a day's labour as many of the sentences must be reread in order that their meaning may be grasped.

[1] "Understanding Human Nature," by Alfred Adler. Translated by Walter Béran Wolfe; 1928. London: George Allen and Unwin, Limited. Post 8vo., pp. 300. Price: 12s. 6d. net.

PROTEIN SENSITIZATION AND ASTHMA.

"ASTHMA: Its Diagnosis and Treatment," by Dr. William S. Thomas,[1] is clearly printed and easy to follow. The author discusses the ætiology and treatment of asthma and hay fever asthma at length. The protein sensitization theory is the main one on which he relies. He considers that most asthma is due to sensitization to foreign proteins, such as pollens, animal emanations, foods and bacteria. For diagnosis the skin tests are used, an urticarial wheal indicating sensitiveness to the particular protein applied. Many people are sensitive to more than one protein. A method of skin testing is described by means of which the pathogenic organisms may be separated from the non-pathogenic in sputum, nasopharyngeal secretions *et cetera*. Treatment is by avoidance of the causative protein in the case of animal emanations and foods and by prophylactic inoculations in the case of pollens and bacteria. The author strongly supports these methods of treatment in preference to any other method, though other methods are considered. A list is given of some hundreds of plants, grasses *et cetera* whose pollen is said to cause asthma in America.

Illustrations of some grasses are reproduced and there are pictures indicating urticarial reactions on the skin. The book is a thorough exposition of the protein sensitization theory of asthma. The author does not give statistics of his own results.

[1] "Asthma: Its Diagnosis and Treatment," by William S. Thomas, M.D.; 1928. New York: Paul B. Hoeber, Incorporated. Royal 8vo., pp. 290, with illustrations. Price: $7.50 net.

A TEXT BOOK OF SURGERY.

THE Twelfth Edition of Rose and Carless's remarkably long lived book, "Manual of Surgery," familiar to students in the 'nineties as it is to those of the present day, has been brought thoroughly up to date.[2] Mr. Carless who himself visited Australia a year or two ago, has had the assistance of several very able men of a younger generation. There are forty-five chapters with an appendix on military surgery. There is also an excellent supplement of X ray photographs illustrating many typical lesions.

Amongst the many new subjects is one by Sir Henry Newland, of Adelaide, on reparative surgery of lips and face.

There are also several beautifully coloured plates, which relieve the impression that the book is of purely academic value, useful for examinations, which the rather closely printed pages are apt at first to give. At the same time for students preparing for examination no more useful book has ever been written.

[2] "Manual of Surgery for Students and Practitioners," by Albert Carless, C.B.E., M.B., M.S. (London), F.R.C.S., and Cecil P. G. Wakeley, F.R.C.S. (England), F.R.S. (Edinburgh); Twelfth Edition; 1927. London: Baillière, Tindall and Cox. Royal 8vo., pp. 1,590, with illustrations. Price: 30s. net.

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The Basis of Clinical Knowledge.

In one of his lectures delivered at the special course arranged by the Melbourne Permanent Committee for Post-Graduate Work, Professor F. R. Fraser pointed out that in the nineteenth century clinical medicine was largely influenced by advances in morbid anatomy and by the recognition of the part played by bacteria in the causation of disease. During the last ten or twenty years advances in physiology have had a dominant influence on medical science. This view was used as an introduction to a discussion on the nature and mechanism of cardiac dyspnœa. Professor Fraser has on another occasion called attention to the regrettable fact that the application of knowledge gained in the physiological laboratory does not keep pace with the acquisition of that knowledge. The subject with which he was dealing, is by no means easy to understand and to elaborate in clear terms. It is even more difficult to translate the signs and symptoms of cardiac failure and its effects on the pulmonary ventilation into the exact language of physics and chemistry. But difficult as this may be, it is within the range of practical medicine. Professor Fraser has given the medical practitioners of Australia a very valuable dissertation on the several forms of dyspnœa judged from the aspects of physiology and clinical medicine. The two lectures which we have been privileged to publish in this journal, will serve to refresh the memory of our readers of the remarkable researches of Haldane, Yandel Henderson, Dreyer and others and to fit the data ascertained concerning the production of dyspnœa, hyperpnœa and anoxæmia into the clinical picture of the patient suffering from heart disease. They will search long before they encounter a more lucid and arresting account. His lectures, however, have an even more important significance. They disclose the urgent necessity for a revision of the attitude taken up by the medical profession towards the fundamental sciences.

The student is taught anatomy, that is the science of the structure of the body, and physiology, that is the science of the manner in which the organs and tissues carry out the functions for which they are destined. It is true that in the ordinary university course the teaching cannot be carried very far. It would take too long to make each medical student an authority on anatomy and physiology. When the student has acquired a satisfactory amount of information on the subjects included in these two great divisions, he enters the clinical schools and starts an entirely new course. From time to time his teachers may refer to some of the information he has gathered in "another place," but the average student feels that he has left the laboratory for good and that the greater part of the biochemistry and biophysics learned for examination purposes, will not be needed again. There is a strong barrier dividing the medical school and the clinic and it requires determination and prescience to scale this formidable wall. Professor Fraser tells the medical practitioners of this generation that the advances documented in the physiological laboratory are exerting a dominant influence on our understanding of disease as we encounter it in our patients. How can these advances be applied to full advantage, if the student is encouraged to regard physiology as a detached examination subject, to be cast aside as soon as he is sufficiently advanced to use a stethoscope and to palpate a real abdomen? He is unaware that the doctrines of pathology that pass muster today, may have to be revised in the light of fresh information concerning the chemical processes that take place in the healthy or diseased body and concerning the physical phenomena that are intimately associated with the chemical processes and that determine in a large measure many of the chemical reactions within the body. If he has forgotten the relatively elementary physiology of his second and third year, how can he appreciate the intricate phenomena that have taken the world of science years of patient and skilled investigation to discover?

The remedy is not far to seek. It has been advocated times without number in these columns. Instead of requiring the student to complete his studies of the fundamental sciences before he enters the clinic, he should be given the opportunity of observing the modifications of normal function associated with disease, while he is being introduced into the mysteries of the healthy body. The physiology of the organs of respiration, of circulation, of digestion and of excretion, of the nervous system and of the special senses is best approached simultaneously with the study of the diseases of these organs and systems or immediately before. Some general teaching in physiology must precede the entry into the wards or out-patient room, but the more advanced work in biochemistry and biophysics should be undertaken throughout the whole course.

The lectures of Professor Fraser provide the most cogent argument in support of the demand put forward over eight years ago by a committee appointed by THE MEDICAL JOURNAL OF AUSTRALIA for a radical reform of the medical curriculum. It is obvious that Professor Fraser has his ears and eyes turned towards the physiological laboratory, ready and eager to snatch every important fact newly elucidated for the advance of medical science proper. We take this opportunity of congratulating the Melbourne Permanent Committee for Post-Graduate Work on its enterprise and attainment.

Current Comment.

GASTRECTOMY IN GASTRIC AND DUODENAL ULCER.

THE treatment of gastric and duodenal ulcer has been discussed in these pages time and time again. Among the aspects considered have been the relative value of medical and surgical treatment, the value of gastro-enterostomy and the manner in which its good results are produced and so forth. Emphasis has always been laid on the necessity for taking a broad view of the whole subject, on the fact that the ultimate cause of ulcer has not been definitely determined and on the impropriety of talking about cure when the alleged cure is accompanied by the mutilation of the patient, even though after being deprived of a large part of an organ, he complains of no untoward symptoms and is able to lead a comparatively normal life. When a surgeon looks at the results of his treatment, he tries to evaluate the suitability of one form of operation and to compare its results with those obtained by another method. Sometimes he is perfectly frank and regards treatment other than that accompanied by removal of tissue, actually or potentially diseased, as so much waste of time; surgeons of another type regard their operations as supplementary to medical treatment and as an incident, regrettable but necessary, in the course of medical treatment. Something can be learned from both types.

Norman C. Lake has recently discussed the late results of gastrectomy in conditions which are apparently non-malignant.[1] At the outset of his article he refers to the several schools of thought which are extant, and in particular to that whose members believe that operative treatment should never be adopted in the absence of acute complications such as perforation. He holds that the claims of this school cannot be entertained. In his opinion the circumstance which is likely to prejudice the surgeon in regard to these claims is the fact that most of the patients on whom he operates, have already received a prolonged course of medical treatment. The medical treatment has done little more than allow the original ulcer to heal without removing the cause. *Post mortem* evidence of completely healed ulcer is much rarer than that found at operation for a fresh outbreak and Lake concludes that medical treatment can rarely bring about a permanent cure. He makes the definite statement that relief of symptoms is not necessarily accompanied by cure of the ulcer. This will be accepted by everybody. It must, however, be applied to results obtained by operation as well as to those following medical treatment.

Lake has investigated the results obtained in the treatment of 221 patients during the period 1922 to 1927. He has not included any patients whose history after operation covered a period less than twelve months. It is more than doubtful whether twelve months' freedom from symptoms after operation is sufficient to justify an estimate of the result of treatment. In this series 65 operations of partial gastrectomy were performed and 71 of gastro-enterostomy. The trend of Lake's views is clear from the fact that in 1922 gastrectomy was performed in 5% of cases and in 1927 the percentage rose to 65. The investigation was made as complete as possible. A series of questions was sent to the patients and those who could be persuaded to submit, were subjected to a series of examinations such as test meals, blood counts and bacteriological examinations. The results were divided into a "satisfactory" and an "unsatisfactory" group. No patient was placed in the "satisfactory" group if he was not taking all kinds of food without restriction. The patients in the "satisfactory" group were divided into three classes: "satisfactory + +" if their answers were all that could be desired and if they added enthusiastic comments about the state of their health; when no additional comment was made, the patient was classified as "satisfactory +"; if the patient was free from symptoms of ulcer, but complained of occasional fullness and of constipa-

[1] *The Lancet*, August 11, 1928.

tion, the result was regarded as "satisfactory." Patients in the "unsatisfactory" group were divided into two classes. If they stated that they were better, but that they still had attacks, they were regarded as "unsatisfactory"; if they had a recurrence of symptoms or if fresh symptoms had arisen, they were classified as "unsatisfactory +." In discussing the specimens removed at operation Lake expresses himself in a slovenly fashion, common, unfortunately, in surgical literature and much to be deprecated: "Of the sixty-five gastrectomies eight were subsequently proved by section to be carcinomatous ulcers and have therefore been placed in a separate table." Of 51 patients submitted to gastrectomy for simple ulcer 49 or 95% gave a result which was either "satisfactory + +" or "satisfactory +"; in one the result was "satisfactory" and in one "unsatisfactory." Of the eight patients from whom carcinomatous ulcers were removed, one died as a result of operation and two subsequently of recurrence. Of the remainder three gave a result which was "satisfactory + +" and two a result which was "satisfactory +." No information is given as to the interval of time which elapsed between operation on these patients and the making of this record. Gastro-enterostomy for simple ulcer was performed on 61 patients; of these 31 or 51% gave a result which was either "satisfactory + +" or "satisfactory +," eight gave a result which was "satisfactory," 13 an "unsatisfactory" result and nine one which was "unsatisfactory +." Of the patients submitted to gastrectomy six died within four weeks of the operation, two of hæmorrhage, two of pneumonia and two of gastric fistula subsequent to the performance of operation of the Billroth I type. Fractional test meals were carried out on practically all patients submitted to gastrectomy and without exception complete achlorhydria was present. When this examination was made "after an interval of several years" it was found that the achlorhydria was permanent. The "reasonable deductions" made by Lake are that gastrectomy gives much more satisfactory ultimate results than gastro-enterostomy; that it has a mortality of about 7%, whereas there is no mortality from gastro-enterostomy; that jejunal ulceration does not occur after gastrectomy, whereas a proportion of patients after gastro-enterostomy has symptoms suggestive of such ulceration and subsequent gastrectomy has sometimes been necessary for definite jejunal ulceration.

If Lake's claims up to this point are regarded purely as offering some indications of the relative merits of gastrectomy and gastro-enterostomy, they will probably be accepted. He goes on, however, to discuss the general causation of ulcer. He regards ulceration as a local incident in a much more fundamental change in the functions of the stomach. This change, however produced, leads to the secretion of an excess of pepsin and hydrochloric acid which may be regarded as the direct exciting cause of the ulceration. Hence he argues that partial gastrectomy is the only operation which removes the cause of the ulceration in the majority of cases and which "can be trusted to result in permanent cure." He adds that some may object to the use of the word cure when the affected part is excised. We are among the number of those who do. It must be pointed out that he advises gastrectomy not only for ulcers of the pyloric part of the stomach, but also for duodenal and jejunal ulcers and for ulcers of the cardiac end of the stomach. If an ulcer in the latter situation cannot be excised, the pyloric part of the stomach should in his opinion be removed. In regard to the cause of ulcer of the stomach no work has yet shown that the view put forward by Bolton of a "gastro-toxin" acting in an area with an impaired circulation, is incorrect. The acid secretion of the stomach according to this view is the factor which keeps the ulcer going, and it is in turn dependent on a disordered hormonic control. According to this view Lake aims at breaking the vicious circle by depriving the stomach of its free acid. If he removes the ulcer, he does not restore hormonic control, although the patient may be free of symptoms. Hence there is no cure. If he does not remove the ulcer, as in the case of a duodenal ulcer or one in the cardiac end of the stomach, he relies on the absence of acid alone to bring about healing of the ulcer. To carry his view to the logical conclusion he ought to perform extensive gastrectomy on all patients with ulcer at whatever stage of ulceration they may be seen. He states that he has not the courage of his convictions and treats patients with early ulcer on medical lines. The effect of leaving a patient with permanent achlorhydria is one which must be considered. It is true that no ill effects have resulted in Lake's patients, but the series is small and the time which has elapsed is so short that no definite conclusion should be drawn.

One further point of interest only need be mentioned, namely the manner in which the achlorhydria after gastrectomy is brought about. One possibility is the view that all the acid-bearing cells of the stomach are removed by the surgeon. There is a certain amount of evidence that this is not so. Kinsella in The Medical Journal of Australia of October 6, 1928, recorded some observations which tend to show that the pyloric end of the stomach alone is not responsible. He also holds that gastrectomy with a view to reducing the secretion of acid is not based on sound physiological principles when the part removed is mostly pylorus. In the same issue there appeared an abstract of an article by MacLean, Griffiths and Williams, in which they hold that duodenal regurgitation is not necessary to bring about the reduced acidity found in the normal stomach during the later stages of digestion. In other words this reduction may be a function of the stomach itself. Lake refers to this paper and suggests that the absence of secretion is also an intrinsic function of the stomach when its general physiology is disturbed by the performance of gastrectomy. This may be so. In any case it is certain that more attention must be paid to the effect of what may be described as capital gastric operation on the nervous mechanism controlling the stomach.

Abstracts from Current Medical Literature.

PÆDIATRICS.

Tuberculosis in Infancy and Childhood.

A. A. SHAPERO (*Archives of Pediatrics*, May, 1928) in discussing tuberculosis in infancy and childhood, concludes that the inhalation path of entrance for the bacilli is by far the most common. Still who investigated 216 children with tuberculosis, found that about 70% were infected primarily by inhalation and about 30% by ingestion. Moist droplets, food or milk and dust, have all been considered vehicles for the conveyance of infection. The latter is now looked on as the main factor. The author believes that inheritance is not so frequently responsible for disease as is supposed and that it can generally be proved that infection was acquired after birth. The mortality of children under twelve from tuberculosis varies from 15‰ to 30‰ according to different investigators. The incidence is more pronounced in the first five years and it is especially noticeable in the second year. During the first three years of life about 25% of all children become infected; from the third to the sixth year, about 50%; from the sixth to the fifteenth the remainder are infected. The younger the child, the more susceptible he is to infection on exposure to the bacilli; the earlier the infection takes place, the more likely is the disease to follow and the graver becomes the prognosis. Between 64% and 81% of all children who have been exposed to the organism, become infected. Schram investigated five hundred children under nine years from tuberculous families and found that 80% had been infected as shown by a positive response to the tuberculin test. He believes that the disease in adults is a sequence to these infections of childhood. No response is obtained to the tuberculin test at birth; a positive response in a child under two years usually means active disease; by the age of fifteen, 80% to 90% yield a reaction owing to past infection. Some conditions which produce a failure to react are: (i) The incubation period of tuberculosis, (ii) acute tuberculous infections with definite constitutional symptoms, (iii) certain infectious diseases, such as measles (100%), scarlet fever (84%), diphtheria (12%) *et cetera*, (iv) tuberculin therapy. It is safer for a child over five years of age to have a healed focus than never to have been infected, for only 10% of infected individuals become diseased. The pathology of human and bovine tuberculosis is identical and the virulence is about the same. Apparently almost all pulmonary, meningeal, bone and joint tuberculosis is of human origin, while abdominal and glandular affections are frequently bovine. The latter is found more frequently before than after five years of age. The symptoms of tuberculosis most commonly found in children are disturbances of nutrition and of general well-being. Anorexia is prominent and there is usually a rise of temperature in the afternoon. A paroxysmal "croupy" cough is found in the presence of enlarged tracheo-bronchial glands. Pulmonary involvement in children is usually basilar. The immediate predisposing cause is often one of the infectious diseases, especially whooping cough. In regard to the prognosis, the conclusion is that in skin, bone, joint and peripheral glandular tuberculosis it is favourable; in pleural and peritoneal involvement it is more serious, but not bad; while intestinal tuberculosis seldom heals and the meningeal and miliary types are fatal.

Calcium Therapy.

P. LUTTINGER (*Archives of Pediatrics*, June, 1928) deals with calcium therapy in children's diseases. It is now proved, he states, that calcium plays one of the chief rôles in the normal metabolism and in the pathological manifestations of childhood. Calcium deficiency occurs in rickets and in a large series of cases of rickets associated with tetany it was found that the blood calcium was about half the normal. It is assumed therefore that the increased neuromuscular irritability in tetany is due to the decreased calcium concentration in the serum. Numerous investigations have proved the assimilability of calcium when given in a suitable form. Holt found that excess of fat in the diet decreased calcium absorption. The most favourable ratio was found to be 0·045-0·060 gramme of calcium oxide to one gramme of fat, provided the infant received no less than four grammes of fat per kilogram of body weight. Excess of fat leads to the formation of insoluble fatty acid soaps with the calcium. Investigations show that human milk contains only a fifth as much calcium as cow's milk, breast-fed infants absorbing 0·06 gramme and bottle babies 0·09 gramme per kilogram per day. As children absorb only 45% of their intake of calcium, it was concluded that the intake must be increased to a minimum of 0·13 gramme per kilogram per day. Other investigators have found that a greater minimum is necessary. Five hundred and sixty-eight cubic centimetres (one pint) of cow's milk furnish one gramme of calcium oxide, therefore a growing child cannot receive enough calcium from milk alone. Green vegetables apparently contain calcium in an assimilable form and are available for older children. Cereal grain and root vegetables are poor in calcium and an abundant meat diet leads to loss of calcium. It has been shown that calcium retention may be increased by the simultaneous use of activators such as cod liver oil or ultra-violet rays and that absorption is favoured by the presence of milk sugar. It has been proved that calcium salts (calcium lactate) can be absorbed and that they act best in an empty stomach and when the alkaline reaction of the duodenum is reduced. Most investigators, the author states, have sided with Findlay in the assumption that faulty calcium metabolism is the main causative factor in rickets. It is deduced that the value of sunlight or of ultra-violet rays is due to the fact that they diminish the acid products in the blood and a rise of blood alkalinity favours calcium retention. Breast-fed infants develope rickets as a result of a deficiency of calcium in the mother's diet. A number of investigators report excellent results with calcium-sodium lactate in rickets, especially combined with ultra-violet rays. Hess strongly recommends calcium lactate in the tetany of rickets. He gives it in very large doses, namely 6 to 7·2 grammes (100 to 120 grains) a day. Harry Litchfield has studied the blood calcium in a number of tuberculous children and finds that there is a definite deficiency. Improvement followed the administration of 0·3 gramme (five grains) of calcium chloride, 0·06 gramme (one grain) of iron, 3·6 mils (sixty minims) of cod liver oil after each meal, together with one tablet of parathyreoid extract three times a day. The author points out that the official dosage of calcium lactate in which form he usually administers calcium, is too small. Children may be given from 0·45 to 1·8 gramme (seven and a half to thirty grains) three times a day, or half these doses if they are exposed at the same time to the sun or to ultra-violet rays. It is best prescribed with milk sugar and given in orange juice.

Acute Appendicitis.

C. W. WOODALL (*New York State Journal of Medicine*, March 15, 1928) makes a study of 295 children under twelve years of age who suffered from acute appendicitis. Of these 85% were six years and over and the youngest patient was two years old. There were twenty-two deaths. Two hundred and sixty-two of the children were operated upon and recovered. Eleven were treated by the Ochsner method and recovered without operation. In 155 instances thirty-six hours or more had elapsed before surgical aid was sought and it was found that the mortality and morbidity rate increased in direct proportion to the delay in operating. If the operation is performed within twenty-four hours, drainage is seldom required, while later localized abscesses, granulation tissue and generalized peritonitis make drainage necessary. The effect of this on the morbidity is shown by the fact that the patients whose peritoneal cavities were not drained, stayed in hospital on an average for ten and a half days, while those in whom drainage was carried out stayed for nineteen and a half days. A study of the appendices revealed one hundred and twenty-six with acute diffuse inflammation,

thirty-seven were gangrenous and sixty-seven were perforated. Nine of the patients with perforation died. The peritoneum was normal in seventy-eight instances, while fifty-six children had free fluid, eighteen had considerable peritonitis, ten had general peritonitis and sixty-one had localized abscess. Two of the patients with free fluid, six with general peritonitis and five with abscess died. There were twenty-two deaths in all. One of the patients who died was seen within twelve hours of the onset, three between twelve and twenty-four hours, one between twenty-four and thirty-six hours, three between thirty-six and forty-eight hours, seven between forty-eight and seventy-two hours and seven after seventy-two hours. Among the deaths were those of seven patients who were treated by the Ochsner method; five of them were not seen by the surgeon until three days after the onset and one not until the fourth day. The author pleads for early operation.

ORTHOPÆDIC SURGERY.

Relaxed Motion in Fracture Treatment.

MERRILL K. LINDSAY (*Journal of Bone and Joint Surgery*, July, 1928) advocates the use of gravity to secure early motion in fractures about joints and he notes that motion which is free in the first few days after a fracture, gradually becomes less in about fifteen to twenty days. At the end of this period sensitiveness has usually disappeared. If active motion is then substituted for relaxed motion, good function is the rule rather than the exception. He believes that the wide range of motion in the first few days has a distinct tendency to replace minor fragments into a relatively normal position.

Osteitis Fibrosa Cystica of the Spine.

ALFRED W. ADSON (*Surgery, Gynecology and Obstetrics*, May, 1928) conforms to the idea that *osteitis fibrosa cystica* is due to infection supervening on trauma. He discusses the pathology of the condition and gives a detailed description of the giant cells in pathological processes. In making a diagnosis special importance is attached to the shell-like tumour and the trauma with areas of rarefaction and spicules of bone irregularly placed within. As much as possible of the tumour should be removed, the remainder should then be curetted out and the wall of the cavity crushed in an inward direction to permit osteoblasts to restore the bone.

The Treatment of Infected Wounds.

WINNETT ORR (*Journal of Bone and Joint Surgery*, July, 1928) describes his method of treating infected wounds without sutures, drainage tubes or antiseptic dressings. The wound is packed widely open in every part with vaseline gauze, but no stitches or tubes are employed. The temporary dressing is allowed to remain for a number of weeks and in fractures is kept in place by a plaster cast until at least primary consolidation of the fracture has occurred. The author stresses the fact that frequent dressings only tend to irritate the wound and extend infection and applies his method in addition to recent contaminated bone and joint wounds, but not actively infected ones.

The Use of Periosteal Transplants.

HARRY E. MOCK (*Surgery, Gynecology and Obstetrics*, May, 1928) advocates the use of an osteo-periosteal transplant in the treatment of ununited fractures. If the graft is encircled with periosteum, the union is more secure. External splinting is far superior to any form of internal fixation and if a considerable defect is to be bridged, the osteo-periosteal transplant is superior to the pure periosteal one.

The Healing Process in Fractures.

ROBERT W. JOHNSON (*Southern Medical Journal*, May, 1928) states that no patient with non-union should be operated upon when the calcium-phosphorus content in the blood is below thirty-five and he lays stress on the value of the importance of blood supply to the fracture. Healthy and physiological activity of the bone cell at and near the site of injury is one of the essentials of healthy union.

Dropped Shoulder.

ARNOLD K. HENRY (*The British Journal of Surgery*, July, 1927) describes an operation of slinging a dropped shoulder. He uses two fascial slings attached to the vertebral border of the scapula, one above the spine and one below it and connecting it to the spines of the sixth cervical and third dorsal vertebræ.

Reconstruction of the Thumb.

GEORGE WARREN PIERCE (*Surgery, Gynecology and Obstetrics*, December, 1927) describes the method of reconstructing the totally lost thumb by a tubed pedicle from the abdomen. In one case reported by him, a bone graft, eight centimetres long, was implanted five months later in the medullary cavity of the metacarpal and slipped into the base of the tubed pedicle.

The Treatment of Spastic Paralysis with Special Reference to the Stoffel Operation.

H. THEODORE SIMON (*New Orleans Medical and Surgical Journal*, April, 1928) discusses the ætiology of spastic paralysis and enumerates various methods of treatment according to the stage in which the case is seen. Spinal puncture is useful if the patient is seen immediately after birth. During the early years of life muscle reeducation and the cultivation of rhythm in the affected limb and attention to improving balance or equilibrium in the lower extremities are useful. Large doses of pituitary gland extract are beneficial in the types associated with lessened mental activity. For the chronic type which has not responded to the above lines of treatment he prefers Stoffel's operation in addition to the usual tenotomies and transplantations and claims gratifying results from its use. He asserts that even in the most severe types when the mentality is nearly normal, the contractures of the adductors of the thigh and flexors of the knee and foot can be relieved by the use of the Stoffel operation.

Peripheral Nerve Complications of Certain Fractures.

HARRY PLATT (*Journal of Bone and Joint Surgery*, July, 1928) in describing peripheral nerve complications of certain fractures, states that the severe lesions in the ulnar nerve are almost always due to ineffective or injudicious treatment, for example imperfect reduction, clumsy manipulation or forced movements of the elbow. The incomplete lesions may be due to a primary contusion or a secondary friction neuritis developing in the first few weeks. On the other hand the median and musculospiral lesions are usually due to direct damage by a sharp bony fragment. They are usually more grave and generally demand operation. Forced movements at any stage of a fracture about the elbow are always disastrous. Early and correct reduction of the fracture followed by a period of complete rest for the elbow of ten to fourteen days and by gradual mobilization by the patient's own unassisted efforts is the method of choice in dealing with these fractures. Primary lesions of the musculospiral nerve are always accompanied by a grave prognosis and should be explored early. Secondary lesions which in the author's experience, are only rarely due to compression by callus and most frequently due to adhesions to a sharp bony margin, should be treated from three to four months before operation.

Purulent Arthritis.

RUDOLPH S. REICH (*Journal of Bone and Joint Surgery*, July, 1928) outlines his method of treating purulent arthritis. He differs slightly from Willems in advising that active motion should begin approximately ten days after all the acute symptoms have subsided. He states that osteogenic infections are the predominating type in children and are usually secondary to osteomyelitis. There is never any indication for frank incision of a joint in synovial infections and rarely in osteogenic infections; even in these it is desirable to avoid incising the articular capsule. The end results in aspiration and lavage of purulent joints are very good and are dependent entirely upon the length of time that has transpired between the inception of the infection and the treatment. The author includes a description of the most favourable sites for aspirating the various joints.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Medical Society Hall, East Melbourne, on September 5, 1928, DR. J. NEWMAN MORRIS, the President, in the chair.

Epicritic and Protopathic Sensation.

PROFESSOR H. H. WOOLLARD read a paper entitled: "The Comparative Anatomy of Epicritic and Protopathic Sensation" (see page 544).

In concluding his paper Professor Woollard asked why a patient could describe sensations which were believed to be thalamic, in the absence of any demonstrable direct connexion between the *thalamus* and the cerebral cortex, where the speech centre and the seat of consciousness were supposed to be.

DR. LESLIE E. HURLEY in opening the discussion and commenting on Professor Woollard's question, said that he had seen a patient whose symptoms had been diagnosed as due to a tumour of the sensory area of the cerebral cortex. The patient was found to have diminished pain sense of one side of his face and in the corresponding hand. At operation a superficial tumour had been found in the parietal cerebral cortex of the opposite side, just behind the face area and measuring four centimetres by three in area with a thickness of about one centimetre. The tumour apparently had been completely removed and the patient's symptoms had been relieved for about six months, when they recurred.

Dr. Hurley cited this case as evidence of the part played by the cerebral cortex in the phenomenon of pain sensation and said that nearly all Continental writers held the view that the appreciation of pain was at least partly a cortical function.

DR. S. V. SEWELL said that he had seen a patient last year from whom Mr. Kilvington had removed a superficial tumour from the parietal cerebral cortex. The patient had manifested diminution of epicritic sensibility on the side opposite the tumour and also some change in pain sensibility on the opposite side. The pain was not less, but was different in character. The tumour appeared to involve only the cerebral cortex. It was an endothelioma and after its removal the peculiar sensory phenomena had persisted twelve months later.

Another patient, with a similar tumour, thought he had been burned, a sensation described by Head as a released thalamic phenomenon. He was a musician and could not afterwards tolerate the sound of music. Speaking of painful memories, Dr. Sewell said that even the most loquacious neurasthenic could not reappreciate and describe a past pain. It was a fortunate fact that the reflex phenomena dependent on pain stimuli did not rise to the cortical level for decision. If they did, the human race would have died out long before. The reflex arc through the *thalamus* and red nucleus was more efficient in emergency.

The epicritic stimuli which rose to consciousness in the cortex modified the effects of the protopathic stimuli which rose to consciousness in the *thalamus*. Disturbance of these occurred in partial lesions of the *thalamus*.

DR. J. F. MACKEDDIE expressed appreciation of the paper. Discussing the subject with Kinnear Wilson and Holmes in London recently, he had found divergent views regarding Head's principles. Kinnear Wilson thought that the cerebral cortex was directly concerned in the appreciation of pain.

Dr. Mackeddie said that he had seen cases similar to Dr. Hurley's in which tumours of the parietal cortex had been associated with disturbance of pain sensation.

DR. LESLIE LATHAM said that it was an interesting question how far the capacity to discuss certain so-called thalamic experiences implied direct connexion between the *thalamus* and the cerebral cortex. Possibly there was too much tendency to associate the cerebral cortex with consciousness and possibly the *thalamus* also should be included as a seat of consciousness.

Difficulties arose in correlating the psychological and physiological aspects of any individual problem of neurology and this was typically a case in which it might be fruitless to press the point too far.

DR. JOHN F. WILLIAMS expressed appreciation of the paper and said that in his experience of six months' work in Queen's Square, London, he had not heard the words epicritic or protopathic mentioned, except with abuse. The subject seemed to have been dropped by the staff there, not because it had been finally disposed of, but because of the difficulty of analysing the changes in sensation due to a nerve lesion, even in an educated man. There were insufficient grounds, Dr. Williams said, for regarding consciousness as a function of the cerebral cortex only. It was possibly a function of the whole organism.

In replying to the discussion, Professor Woollard said that a very important question had been raised by Dr. Sewell. In thinking of neurological problems it was necessary to think in terms of what was biologically useful. The speech centre was believed to be in the cortex and not in the *thalamus*. Professor Woollard thought it arguable that verbal description by a patient of sensations due to a thalamic lesion implied some direct thalamo-cortical connexion.

MEDICO-POLITICAL.

ANNUAL MEETING OF THE DELEGATES OF THE AFFILIATED LOCAL ASSOCIATIONS OF MEMBERS WITH THE COUNCIL OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION.

THE annual meeting of the delegates of the local associations affiliated with the New South Wales Branch of the British Medical Association with the Council of the Branch was held at the B.M.A. Building, 30-34, Elizabeth Street, Sydney, on October 6, 1928, DR. J. E. V. BARLING, the President, in the chair.

The following delegates were present: Dr. K. S. M. Brown (Central Western Medical Association), Dr. A. G. Brydon (Northern District Medical Association), Dr. G. A. Buchanan (Central Southern Medical Association), Dr. C. Clark (Central Northern Medical Association), Dr. A. M. Davidson (South Sydney Medical Association), Dr. O. A. Diethelm (North Eastern Medical Association), Dr. A. M. Gledden (City Medical Association), Dr. W. B. Grant (Balmain District Medical Association), Dr. H. Hunter (Eastern Suburbs Medical Association), Dr. A. M. McIntosh (Western Suburbs Medical Association), Dr. H. F. J. Norrie (Northern Suburbs Medical Association), Dr. J. T. Paton (Western Medical Association), Dr. R. A. Robertson (Border Medical Association), Dr. W. F. Simmons (Illawarra Suburbs Medical Association).

New Branch Building.

DR. W. H. CRAGO, the Honorary Treasurer, informed the delegates that the response to the invitation of the Council to members to take up debentures in the new building had not received as general a response as he had hoped. The work of demolishing the existing buildings had been begun. Steps were being taken to obtain from the City Council the balance of the money due on the compulsory sale of the premises at 30-34, Elizabeth Street. It was desired to secure sufficient money by means of debentures to pay off the outstanding charges on the land before proceeding with the erection of the new building. He appealed to the members to take up debentures and expressed the hope that each delegate would endeavour to persuade the members of his local association to take up at least one debenture of £50.

Hospitals.

DR. H. HUNTER on behalf of the Eastern Suburbs Medical Association moved:

> That there should be a hospitals commission of three to control the establishment of new hospitals

and closing of old ones, as required, and all matters pertaining to hospital administration, one of the commissioners at least to be a qualified medical practitioner.

He pointed out that the control of hospitals in Australia was of a kind that led to abuse and difficulties. Under it the medical profession would not obtain the conditions to which it was entitled. There was room for improvement in every detail of administration and management. He advocated a central control and held that a small commission of three members would prove to be the best body to undertake this control. A larger body would be unwieldy and he felt sure that it would have no advantages over a small commission. There should be one medical member of the commission. This would suffice to bring the medical aspects of the problems before the commission on all occasions. There were very many people in public hospitals who had no right to take advantage of these institutions. The conditions of admission would be in the hands of the commission and it was not too much to expect that the defects of the present system would soon be remedied. The commission would have a very important task to determine whether any existing hospitals should be closed and where new ones should be established.

DR. A. M. DAVIDSON seconded the motion. In discussing the proposal, he expressed the opinion that it would be more advantageous if there were more than one medical man in the commission.

The President invited each delegate to express the opinion of his association on the subject. Dr. W. B. Grant stated that the Balmain District Medical Association was in accord with the motion.

DR. R. A. ROBERTSON (Border Medical Association) also supported the motion. He held the view that there should be an accountant, a business man and a medical practitioner on the commission.

DR. C. CLARK (Central Northern Medical Association) said that he was instructed to support the motion on the ground that the administration of country hospitals would be regularized by a commission and the medical staff would not be exploited.

DR. G. A. BUCHANAN (Central Southern Medical Association) thought that the motion was desirable in principle. He spoke of the urgent necessity for improvement of the arrangements for the care of patients suffering from infectious diseases. The arrangements at the present time for the admission and care of these patients were very primitive in the Goulburn district. He criticized the hospital administration. In regard to the transport of patients he pointed out that there was no coordination between the ambulance and the hospitals with the result that there was overlapping. The motion represented the first point in the development of a sound principle.

DR. K. S. M. BROWN (Central Western Medical Association) was dissatisfied with the existing administration of hospitals. There was cause for complaint in all parts of the State. It was advisable to have a permanent board of appeal. He held that a central authority would make for economy and efficiency. He discussed the question of the payment for medical services by patients who could afford it. There was much abuse; many patients were claiming gratuitous attendance who should be treated in private. The medical profession was to some extent to blame. There ought to be more coordination and harmony among the members of the medical staffs.

DR. W. F. SIMMONS (Illawarra Suburbs Medical Association) objected to representation of the friendly societies on the hospital boards. He hoped that they would be able to persuade the Minister of Health to set up a commission under the provisions of the new Hospitals Bill.

DR. A. G. BRYDON (Northern District Medical Association) thought that one member of the commission should have special knowledge and experience of country hospital administration.

DR. O. A. DIETHELM (North Eastern Medical Association) anticipated that if a commission were set up, the local hospital boards would soon be induced to administer their institutions in accordance with the regulations.

DR. H. F. J. NORRIE (Northern Suburbs Medical Association) advocated the appointment of an independent commission to coordinate the work. The commissioners should be men of wide experience.

DR. J. T. PATON (Western Medical Association) stated that his association had left it to his discretion to support or to oppose the motion. He thought that there might be considerable difficulty in securing the services of three competent commissioners. There would be an enormous amount of work to do. There would be a display of much jealousy on the part of the hospital boards if there was a central control. He approved of the principle underlying the motion.

DR. A. M. MCINTOSH expressed the opinion that the existing system of administration by the secretary of the country hospital was haphazard and often unsatisfactory. He was sure that it would make for economy if there were centralized control. Moreover, the standardization of the rules for admission would be a great advantage.

DR. R. H. TODD, Honorary Secretary, gave an account of the views of the Council in regard to the administration and control of hospitals. The proposals that the Council had put forward had reference to district hospitals only; that meant the hospitals under the *Hospitals Act*. It did not touch the teaching hospitals nor the State hospitals. A scheme had been prepared and this had been submitted to the Minister for Health. As the scheme was relevant to the matter under discussion, he read it.

The scheme was set out, in skeleton, roughly as follows:

1. All the district hospitals (some 200) to be under one control, *exempli gratia* a hospital commission.

2. The hospital commission to be a body corporate with perpetual succession, with power to take, purchase, sell, lease and hold lands, goods and chattels and other property.

All the district hospitals to be vested in the commission in respect of lands for an estate in fee simple.

To consist of, say, three persons, *exempli gratia* a business man, a finance man and a medical man appointed for, say, seven years, without prohibition against reappointment, with adequate salaries, say, £3,000 *per annum*, to have a complete secretariat and staff, including hospital inspectors, medical officers, to be, where required, resident medical officers of district hospitals.

All money appropriated by Parliament for the construction, maintenance and management of district hospitals to be vested in the commissioners and to be expended under their control and management.

All contracts to be with the commission; all supplies and stores, except food and perishables *et cetera* obtainable locally, to be provided by the commission.

The commission to coordinate all the hospitals and generally to control and manage the hospitals except in so far as immediate local supervision is necessary.

3. Each district hospital, according to its possibilities, to be self-supporting in the same way as private hospitals must be self-supporting. All patients admitted to the hospital, other than indigent persons and serious accident cases requiring first aid and perhaps continuous treatment, to be required to pay the hospital for board, lodging, medicines, dressings, nursing and other services and general maintenance according to their means in accordance with schedules of charges provided to meet the circumstances. So far as medical attendance is concerned, every reputable legally qualified medical practitioner in the district to be able to attend patients under his care at the hospital in the same way as if it were a private hospital. The hospital to be required to collect payments for all paying patients and to account to the commission for all beds occupied and services given. It would necessarily be a function of the district hospital to admit indigent persons free of charge as well as serious accident cases requiring immediate treatment and care.

4. Specialty services, *exempli gratia* ophthalmic, aural and obstetric, could be provided where appropriate. Auxiliary services, *exempli gratia* X ray and laboratory, would require to be provided wherever possible for the purpose of diagnosis and treatment.

5. In course of time health and welfare services could be associated with the hospital as a health centre.

6. Each district hospital would require a medical staff, *exempli gratia* one or more visiting medical officers and/or one or more resident medical officers who would attend the indigent patients and accident cases and exercise necessary administrative control. There would, of course, be a nursing staff with a matron or nurse exercising necessary administrative control.

7. Each district hospital would probably require to have a manager or a local board of management who would report to and receive instructions from the commission.

8. Capital expenditure, *exempli gratia* for buildings and other purposes, would be undertaken and controlled by the commission. The commission would obtain all funds required for its purposes direct from appropriations by Parliament.

In a discussion on the methods of financing the hospitals Dr. G. A. Buchanan said that he trusted that the New Zealand scheme would not be followed. It was far from satisfactory to the medical profession. He had noticed that there was an attitude of hopelessness among the members of the profession. He favoured a voluntary method of subscriptions.

DR. W. F. SIMMONS thought that the hospitals might be financed in part from money raised by an entertainment tax, by making insurance against third party risks for motor car drivers compulsory and by requiring life assurance societies to make contributions.

DR. C. CLARK held that the existing contributory schemes were inimical to the interests of the medical profession.

DR. H. F. J. NORRIE referred to the American system of community hospitals under which the persons or bodies sending the patient to the hospital, were responsible to pay for them.

In his reply Dr. H. Hunter pointed out that the subject had been shelved over and over again and he trusted that the Government would not leave it where it was. He claimed that the hospital question was one of great urgency and that it should be taken up without further loss of time. The majority of people thought that they were entitled to free medical attendance in hospitals. He was satisfied that the medical profession would have its interests safeguarded by a commission of three. It might be advisable to have a medical man as chief commissioner and two others as assistant commissioners. The commission would dictate matters of principle and the local boards would carry out the policy thus enunciated. He did not believe that the appointment of a commission would lessen the interest taken in the hospital by the local community. The local people would soon realize that if they wanted a good service, the cost would be higher than if the hospital were under a central control. A scheme of hospital finance was essential. If the patients could pay, they should be made to do so. He admitted that there was some difficulty in discovering the means of individual patients. It might be necessary to require persons seeking admission as non-paying patients in hospitals to sign a declaration of their income. He was satisfied that a local rate was a bad proposal. He wished to see every hospital self-supporting. His motion was intended to include the large public hospitals as well as the district and small country hospitals.

The motion was put to the meeting and was carried.

DR. J. T. PATON (Western Medical Association) moved:

> That the Minister of Health be asked to incorporate in the proposed new Hospitals Bill a clause giving visiting medical officers of country public hospitals the right to charge patients in such hospitals.

He pointed out that rules existed in the majority of hospitals prohibiting the medical attendants from accepting fees for their attendance. In some hospitals the medical officers had the right to charge private patients who paid hospital charges. He thought that the best way of overcoming the difficulty was to establish special wards for private patients. The medical officers should be entitled to make arrangements with their patients without interference by the hospital board.

DR. R. A. ROBERTSON (Border Medical Association) seconded the motion. He stated that in his district it had long been the practice to charge their patients. They knew the financial position of practically every one in the neighbourhood. He admitted that this was not the case in the city or suburbs.

DR. A. G. BRYDON said that in his district the boards of many of the hospitals granted the privilege to the medical officers. The district hospital was often the only place where certain forms of treatment could be carried out. It was in consequence necessary to admit all patients requiring treatment of the kind to hospital. Patients who were not able to pay full fees for the private wards, often paid full maintenance fees in the free wards and paid their medical attendants intermediate fees. As it had been anticipated that difficulties might arise, they had obtained the right to refer all matters of dispute to arbitration. During the two years since this arrangement had been made, not a single dispute had been referred to arbitration. Every one seemed to be quite satisfied.

DR. R. H. TODD pointed out that Model Rule 62 of the Model Rules for district hospitals published under the authority of the Minister of Public Health provided that medical practitioners including the members of the medical staff, subject to the consent of the committee in each case, might receive fees from private patients, provided that such patients had paid to the hospital committee at least the full cost of maintenance. The maintenance fees were to be determined by the average cost per occupied bed during the past twelve months. It would be useful if the delegates expressed the opinion whether or not the rule should be made compulsory.

DR. J. T. PATON did not want to have to obtain the sanction of the committee. In emergency it might be impossible to obtain the sanction before the patient was admitted.

DR. A. M. MCINTOSH thought that the original motion was too wide and that it was not applicable to metropolitan and some suburban hospitals. He objected to the principle of giving to honorary medical officers the right to do a thing that they were entitled to do.

Dr. Paton reminded Dr. McIntosh that he had obtained permission to amend his original motion by the insertion of the word "country" before public hospitals.

DR. W. F. SIMMONS held that if the country hospitals possessed private wards, the whole difficulty would disappear.

DR. A. M. DAVIDSON suggested that the principle should be approved. If this were done, the application could be suited to any set of local conditions.

The motion was put to the meeting in the following form:

> That the Minister of Health be asked to incorporate into the proposed new Hospitals Bill a clause giving visiting medical officers of country public hospitals the right to charge patients in the public wards of such hospitals, who are in a position to pay private medical fees.

The motion was carried.

DR. W. F. SIMMONS (Illawarra Suburbs Medical Association) moved:

> That the Council be requested to formulate a uniform scheme for visiting hospital medical service.

He referred to the fact that Professor P. F. Sandes had suggested in 1927 the adoption of a form of agreement for use between medical officers and hospital boards. As a result of this proposal a meeting had been convened with the object of discussing the best way of introducing uniformity into the hospital medical services. A subcommittee had been appointed with Dr. Archie Aspinall, Dr. D. J. Glissan and Dr. J. C. Storey as members. The subcommittee had encountered difficulties from the start and nothing had been done. He was convinced that if they hoped to attain uniformity, the necessary steps

would have to be taken by the New South Wales Branch of the British Medical Association for the whole State. He spoke of the scheme that had been formulated by the Hospitals Committee of the British Medical Association. This scheme had been referred to the Council and had formed the basis for the policy of the Association. The sporadic efforts that had been made in New South Wales in the past had been insufficient for the protection of the medical officers of hospitals.

The motion was seconded *pro forma* by Dr. H. F. J. Norrie.

In reply to a question, Dr. Brown Craig stated that the subcommittee had been unable to face the problem and was no longer acting.

DR. R. H. TODD explained that the meeting to which Dr. Simmons had referred, had been a meeting of the members of the visiting staffs of the large public hospitals. After certain aspects of the hospital question had been discussed, a subcommittee had been appointed to form an association of medical officers of public hospitals for the purpose of safeguarding their interests. The subcommittee had not been given a programme. Differences of opinion had prevented the subcommittee from making any headway. At a later date the same men had been asked to reconsider the question. The members had not given up their task. It was felt that if any association were formed, it should be based on a broader principle than that originally suggested and that it should be the function of such an association to deal with all matters connected with hospitals. A constitution was being drafted and it was hoped that it would embody a concrete proposal. Dr. Todd held that while the Council of the Branch might formulate a scheme, it would probably not be so effective as if the medical officers of the public hospitals did so themselves. In England the hospital question had been under consideration for many years. The Hospitals Committee was a standing committee of the British Medical Association, the members of which were appointed partly by the Representative Body and partly by the Council. This committee had evolved the hospital policy which had been dealt with by the Representative Body during several years. The problems in Australia were very similar to those in England.

DR. BROWN CRAIG (Council) spoke in support of the motion. He was fully seized with the difficulties. There seemed to be consensus of opinion that there was only one organization that could take up the matter. There was a real need for a definite policy and the Council of the Branch had to formulate that policy. When the scheme had been prepared, it should be submitted to the interested parties.

After further views had been expressed, the motion was put to the meeting and was carried.

DR. R. H. TODD moved for Dr. W. B. Grant (Border District Medical Association):

> That all honorary medical officers be adequately insured by the hospital which they serve against injury or sickness incurred on the way to or from the hospital and whilst performing their duties at the hospital.

The motion was seconded by Dr. C. Clark, who said that he had brought the subject to the notice of the board of the Newcastle Hospital. The matter had received sympathetic consideration.

The motion was carried.

Ambulance Transport.

DR. H. HUNTER (Eastern Suburbs Medical Association) moved:

> That the ambulance transport service of the State should be organized to coordinate with or/ and be regulated by the Hospital Commissioners.

He explained that the transport service was by no means satisfactory. There was great need for a better organization of the service.

DR. J. ADAM DICK, C.M.G., in seconding the motion admitted that the Ambulance and Transport Brigade was an unwieldy body and that the central administration was too rigid. He explained the machinery of the organization particularly in regard to the arrangements with employers.

DR. A. G. BRYDON (Northern District Medical Association) maintained that the officers of the ambulance service aimed at publicity. They wished to put up a record of a large number of miles travelled. He had found that the ambulance was at times used for purposes not contemplated by the organization.

DR. A. M. DAVIDSON (South Sydney Medical Association) thought that the defects of the ambulance service were largely a matter of finance.

DR. G. A. BUCHANAN raised the question whether or not the motion should be pressed, in view of the fact that it was proposed to subject the service to a body that had not been formed.

DR. K. S. M. BROWN held that the ambulance transport service was not efficient. He thought that the motion did not provide the best method of meeting the difficulty. He moved as an amendment:

> That this meeting does not approve of the ambulance service of the State, as at present administered, but is of opinion that it should be under the hospital commission, if one be formed, if not that the *Ambulance Transport Service Act* be amended to place the service under a commission.

Dr. Hunter withdrew his motion in favour of the amendment. He was prepared to second the substituted motion.

DR. J. T. PATON pointed out that the ambulance was run by the local committee in the country districts. The central board had no control or authority. The local committees raised the necessary funds when an ambulance was required. He thought that as a rule the people serving on the local committees were not the right people for the task. The control should be in the hands of committees on which the medical profession was largely represented. If this were done and care were taken to prevent undue interference by the central board, he thought that all difficulties would disappear.

It was pointed out that according to the provisions of the act the board had no power to leave the control in the hands of the local committee. After some further discussion the motion was put to the meeting and was carried.

Workers' Compensation Act.

DR. H. HUNTER moved on behalf of the Eastern Suburbs Medical Association:

> That the *Workers' Compensation Act* be so amended that the hospitals be enabled to obtain compensation for maintenance and medical treatment of injured workers admitted to hospital.

Dr. Hunter pointed out that the hospitals were entitled to compensation in regard to the loss incurred in the maintenance of an injured worker under the provisions of the *Workers' Compensation Act*, 1926-1927, but that they could not recover fees for medical services. He claimed that if full maintenance costs were repaid, the medical officers should be able to charge for their services. He suggested that a reasonable fee should be fixed.

DR. C. CLARK seconded the motion.

DR. T. W. LIPSCOMB informed the meeting that the Council of the Branch was taking steps with the view to the amendment of Clause 10 (vii) of the Act. Certain action had already been taken and it was proposed to follow this up with strong representations in favour of the desired alteration of the law.

The motion was carried.

DR. G. A. BUCHANAN (Central Southern Medical Association) moved:

> That the position of the Railway Department be defined with reference to dealing with cases which should apparently come under the *Workers' Compensation Act.*

He raised the question whether the Railway Commissioners should be allowed to evade the provisions of the

act. When a railway employee met with an accident, he was given the option of drawing full pay and no further compensation or obtaining the benefits of the act. In actual practice the men had no alternative but to accept the former.

DR. J. T. PATON (Western Medical Association) called attention to a motion standing in his name dealing with the position of the police department. He thought that the two motions might be taken together.

DR. R. H. TODD explained that the *Railway Act*, 1922, provided for the payment of full wages to injured employees. The *Workers' Compensation Act*, 1926, however, specifically named the Railway Commissioners for New South Wales as employers liable under the act to pay compensation to their employees. Injured employees were entitled under the act to compensation in respect of medical, surgical and hospital treatment. The police were specifically exempted from the provisions of the act. He suggested that the medical practitioner called upon to attend injured workers employed in the New South Wales Railways might sue the patient for recovery of the fees for attendance if the fees were not paid. The injured worked would then have to pay and he could claim compensation from the employer, the Railway Department. If the matter were contested, the Insurance Commissioners would have to give a decision. It was no business of the medical profession to take steps to compel the Railway Commissioners to carry out their obligations to their employees under the act. The medical profession should look to the patient for payment. The *Workers' Compensation Act* had not altered the relations between doctor and patient in the matter of recovery of fees for attendance.

DR. G. A. BUCHANAN contended that if the medical practitioners had the right to charge the patient, they would have the right to go to the government to force the Railway Commissioners to do their duty. He objected to the idea of suing patients.

It was pointed out that it would be useless to approach the Government unless definite evidence were available in regard to the practice of the Railway Department. It was stated that this evidence was available.

The motion was carried.

Dr. Paton's motion referred to above, was withdrawn.

DR. H. HUNTER (Eastern Suburbs Medical Association) moved:

> That Schedule "D" be amended with a view to raising the ordinary fees at surgery, hospital or patient's home.

His association held the opinion that a mistake had been made in fixing the rate of fees for visits. They were setting a new standard of fees. It was one thing to make a contract with the friendly society lodges for attendance on persons with limited means. When they were dealing with insurance companies there was no question of a contract to provide attendance at reduced rates. The fees set out in the schedule did not suit the members of his association. He suggested that they should charge twelve shillings and sixpence for the first visit and ten shillings and sixpence for subsequent visits. When the patient was seen at the practitioner's surgery the fee should be ten shillings and sixpence.

DR. J. ADAM DICK seconded the motion. He approved of the contention that they should press the insurance companies to pay full fees.

DR. C. CLARK agreed in principle, but foresaw some difficulties. The act provided that the fees payable should be those ruling in the district. Once they set down a fixed rate of fees, they could not contend that it would apply in all parts of the State.

DR. A. M. DAVIDSON opposed the motion. He maintained that schedule "D" was working admirably. They received their cheques from the insurance companies in the majority of instances by return of post. He regarded the insured workers under the act as intermediate between private patients and lodge patients. He disapproved of any movement that might stir up a hornet's nest.

DR. A. G. BRYDON agreed with Dr. Davidson. He thought that the profession had benefited by the introduction of the schedule which was working satisfactorily.

The motion was put to the meeting and was lost.

DR. A. M. MCINTOSH (Western Suburbs Medical Association) moved:

> That in Schedule "D" the fee for assisting at operations be made uniform with the fees for administering general anæsthetics, namely: major operations three guineas and minor operations one guinea.

He claimed that the assistant should be paid a fee appropriate to the services rendered. If the operation were a long one, a fee of one guinea was quite inadequate.

DR. A. G. BRYDON seconded the motion.

DR. W. F. SIMMONS (Illawarra Suburbs Medical Association) called attention to the fact that the anæsthetist carried a much greater responsibility than the assistant. He agreed, however, that the fee for assisting at an operation was too low.

The motion was carried.

Friendly Society Lodge Practice.

DR. K. S. MACARTHUR BROWN (Central Western Medical Association) moved:

> That the time is now opportune for the rate for attendance on members of friendly society lodges which have their meeting place within the metropolitan area, to be increased from twenty-six shillings to thirty-two shillings per member *per annum*.

The motion was seconded by Dr. A. M. Davidson, who stated that the members of the friendly societies were better off than they had been when the existing rates had been fixed.

DR. H. F. J. NORRIE advocated an increase of fourteen shillings. He pointed out that there had been a great increase in the amount of lodge work and medical practice had further been encroached on by the *Workers' Compensation Act*.

A short discussion ensued and it was agreed that the motion should read "to be increased from twenty-six shillings to thirty-six shillings."

DR. T. W. LIPSCOMB hoped that the delegates would not carry the motion. The common form of agreement was working very smoothly. Other members spoke both for and against the motion. On being put to the meeting it was declared lost.

DR. H. F. J. NORRIE moved:

> That a fee of five shillings be charged for attendance on lodge patients on Saturday afternoons, Sundays and public holidays.

He stated that many lodge patients made it a practice to send for the medical officer on a Saturday afternoon or Sunday morning or on a public holiday, when there was no real need for the visit. If a charge were made, the patients would not demand these visits save in emergency.

DR. W. F. SIMMONS seconded the motion.

The motion was lost.

DR. J. T. PATON moved:

> That in any revision of the common form of agreement provision be made for the charging of additional fees where operative and manipulative procedures are instituted in accouchement cases.

In explaining his motion Dr. Paton said that it was proposed to charge extra for the application of forceps and for version and similar procedures. He did not ask that the agreement should be amended, but that when other amendments were being considered, the Council should ask for this change.

DR. W. F. SIMMONS seconded the motion.

DR. A. M. DAVIDSON opposed the motion on the ground that a general principle was involved. A medical practitioner undertaking to attend a woman in her confinement, should be prepared to carry out the necessary treatment.

He referred to the question of ante-natal care. This was always regarded as incidental to the confinement and no extra fee was demanded.

Other members held that it would be preferable to raise the flat rate. An amendment was moved to this effect, but was lost. The motion was put to the meeting and was lost.

DR. W. F. SIMMONS (Illawarra Suburbs Medical Association) moved:

> That the common form of agreement be amended to define night-time as from 6 p.m. to 8 a.m.

He supported his proposal by stating that it was common for lodge patients to request a visit late in the day, when with a little consideration the call might have been made at an earlier hour. The medical officer of the lodge was becoming a slave to his patients.

The motion was seconded by Dr. H. Hunter.

It was urged that no amendment of the common form of agreement was desired and the mover and seconders therefore obtained leave to amend the motion by the insertion of the words "In any revision." The motion as amended was carried.

DR. W. F. SIMMONS moved:

> That the common form of agreement be amended to allow of evening consulting hours on Monday, Wednesday and Friday evenings only except for urgent cases.

DR. H. HUNTER seconded the motion. He pointed out that lawyers, dentists and Macquarie Street specialists did not expose themselves to night calls. The medical practitioner was allowing his patient to exploit him and it was necessary to restrict the amount of night work and evening work in their lodge practices.

It was ultimately decided that in the event of an amendment or revision of the common form of agreement being undertaken, this amendment should be introduced.

Amendment of Constitution.

DR. A. M. DAVIDSON (South Sydney Medical Association) moved:

> That the constitution of the Council of the New South Wales Branch be amended so that local associations shall have direct representation on the Council.

He claimed that it would be advisable to give medical practitioners residing outside the city an opportunity of placing their views before the Council. In many districts in the State they had peculiar problems. The Council was out of touch with the practical conditions in remote districts. He did not think that it would be necessary for the representative of a local association to be a member of that association. A practitioner in the city might be nominated.

DR. A. G. BRYDON seconded the motion. He paid a tribute to the work of the members of the Council. He thought that it would be an admirable thing if the local associations had direct representation on the Council. Few men residing in the city had recent experience of country affairs. There were many men interested enough to come down to Sydney for the purpose.

DR. J. T. PATON opposed the motion. He did not think that it would be possible for country members to attend the many meetings of the Council. They would be worse off than they were at present, if they depended on the attendance of men from remote distances and these men were absent from the majority of the meetings.

The difficulty that would be encountered in giving effect to the motion was explained. The motion was lost.

Prescribing by Pharmacists.

DR. H. F. J. NORRIE moved:

> That steps should be taken to prevent prescribing by pharmacists.

He admitted that this was a well worn motion. It was recognized that counter prescribing was common and that some pharmacists conducted medical practice.

DR. W. F. SIMMONS, in seconding the motion, stated that he wished to stop pharmacists from carrying out surgical treatment and even surgical operations.

In the course of a short discussion it was pointed out that it would be impracticable to give effect to the motion. The Pharmaceutical Council would like to stop the practice, but realized the grave difficulties. In a proposal put forward by the Pharmaceutical Council, it had been suggested that if medical practitioners would give up dispensing medicines, the Pharmaceutical Council would take steps to prevent pharmacists from prescribing save for minor ailments.

The motion was carried.

Votes of Thanks.

A hearty vote of thanks was accorded to the Council for their hospitality and to the chairman for his manner of conducting the meeting.

Public Medical Officers' Association.

At the conclusion of the business Dr. H. Hastings Willis, Honorary Secretary, and Dr. E. L. Morgan, Honorary Treasurer of the Public Medical Officers' Association of New South Wales, were granted permission to address the country delegates.

Dr. Willis first apologized for the absence of his President, Dr. S. Evan Jones, who had been detained out of town by his departmental duties. He thanked the delegates for their courtesy in giving him an opportunity of bringing the activities of his association under their notice. This was the main object of the visit of Dr. Morgan and himself that afternoon, as although many city and suburban practitioners were acquainted with their doings, he had reason to believe that few country practitioners knew of the association's existence. If as a result of the deputation's appearance there that afternoon country practitioners acquired a sympathetic interest in the doings of the Public Medical Officers' Association, he would be well pleased. That association had been formed two years previously with the object of bettering the position of full-time salaried medical officers in the various public services and had met with some measure of success. Valuable assistance had been given by the Council of the New South Wales Branch of the British Medical Association, but the support of the whole body of private practitioners was also desired. Owing to the late hour and the arduous day's work the delegates had just completed, he would not attempt to deal with all phases of the associations' activities, but would content himself with bringing to their notice the two most important matters, namely salaries and the lay control of medical services.

In regard to salaries he thought it was generally agreed in the profession that salaries in the public medical services in the past had been too low. His association had drawn up a claim for increased salaries which had been approved by the Council of the New South Wales Branch of the British Medical Association. The claim had been placed before the New South Wales Public Service Board. After prolonged negotiations an agreement had been concluded binding upon both parties for three years from July 1, 1927. This did not give all that was asked for, but provided for a welcome increase on existing salary rates. It is not expected that any vacancy in a position covered by that agreement would be advertised at a lower rate than had been agreed upon, but from time to time new positions might be created at salaries less than was considered by the public medical officers as a fair thing. It would help his association very much if practitioners were to make full inquiries before applying for positions so advertised. A matter which seriously embarrassed his association, was the large numbers of applications for positions advertised. Of course, there was no reason why practitioners should not apply for any Government position advertised and he felt he was on delicate ground in suggesting that they should not do so, but he trusted

he might be pardoned for pointing out that under the *Public Service Act* preference must be given, other things being equal, to applicants already in the Government service and that the flood of applications from the ranks of private practitioners was having a powerful influence in keeping salaries low. As an instance he referred to a position advertised at £800-£900 *per annum* which had been filled by promotion within the service, but which had attracted over seventy applicants from outside, which fact had later been used as an objection by the Public Service Board to the request for a minimum salary of over £1,000 for that position. It was felt that had they made inquiries, many of the applicants would have realized that they had no reasonable chance of appointment and would have not made an application the only result of which was to keep the salary low. In another instance while the association had urged that £850 should be fixed as a minimum salary for a certain specialist appointment, it was advertised at a salary of £750 *per annum* and applications from several men of undoubted competence had been received. This had prompted the Public Service Board to declare that they had proved that £750 *per annum* was the market value of a medical specialist.

Dr. Willis did not quite know how such things could be prevented; his association had suggested that the delegates should be asked to bring to the notice of members of local medical associations that the flood of applicants, chiefly country practitioners, was a powerful factor in keeping at a low level the salaries of public medical officers who were entirely dependent upon their salaries for an existence.

Another way in which country practitioners could help the public medical officer was by refraining from advocating the creation of new whole-time government positions at a low salary. It sometimes happened that a successful practitioner, usually one about to retire from practice, took an interest in local politics and advocated the appointment of a full-time medical officer of health or government medical officer and to commend his scheme sometimes said that it would not cost much. Salaries as low as £500 or £600 *per annum* were at times mentioned as sufficient. The Public Medical Officers' Association did not consider such salaries satisfactory and hoped that £1,000 *per annum* would in future be mentioned. The view was that if there was not sufficient work of value to the community to warrant a salary of £1,000 *per annum*, the position should not be created at all. The Public Medical Officers' Association desired a smaller number of competent, well paid public medical officers rather than a large number of poorly paid positions which would only attract incompetent men and did not desire the creation or perpetuation of any office which was not fully justifiable in the public interest.

The second question which it was desired to bring before the notice of the delegates, was the question of lay control of medical services. This had become a matter of practical politics within the last few months, because of the plan in Brisbane to abolish the position of medical officer of health and place the Health Department of that city in the control of a layman and of the provisions in the *Public Health Bill* before the Victorian Parliament which would bring all medical officers employed in the various Victorian Government services into one depôt under the control of a lay under-secretary, and of the failure to provide for a medical member on the proposed commission to administer the national insurance scheme.

Dr. Willis said he felt he was on sound ground in asking the profession to resist this tendency to subordinate medical men to laymen in medical matters. He asked that the British Medical Association in Australia should stand for the principle of medical control of medical activities and insist that the head of each medical service should be a medical man and have direct access to the responsible member of the Government. In England the British Medical Association had for years urged that the Director-General of Army Medical Services should be a member of the Army Council with direct access to the Secretary for War and he hoped that the profession in Australia would urge that the proposal national insurance commission which would deal with the question of medical certification, the most troublesome of all questions in connexion with a health insurance scheme, should include a medical member who should be the director of whatever medical services, whole or part time, which might be created under the act.

In conclusion Dr. Willis hoped that the relations between the Public Medical Officers' Association and the local associations would be cordial. Though only one hundred odd in all and therefore about one-twentieth of the profession in New South Wales, the public medical officers had special interests which warranted the formation of an association of their own. It was the intention of his Committee to work in harmony with the New South Wales Branch of the British Medical Association and the local medical associations. There were occasions when individual practitioners and public medical officers did not agree, but he felt that disagreements would be fewer if each tried to appreciate the other's point of view. He felt that he was expressing the view of the public medical officers when he said that they would try to appreciate the practitioner's point of view in contentious matters and he asked that the practitioner should reciprocate, always bearing in mind that the attitude a public medical officer might take up in any matter might be dictated not by his own inclinations so much as by the policy of the department to which he belongs.

Dr. Morgan said that he would not do more than endorse what Dr. Willis had said, to express the friendly sentiments public medical officers as a whole felt towards their colleagues in private practice and to thank the delegates for their courtesy in giving his association an opportunity of bringing its activities under their notice. He trusted the friendly relations established that afternoon would continue.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Medical Society's Hall, East Melbourne, on September 5, 1928, DR. J. NEWMAN MORRIS, the President, in the chair.

Schedule of Subscriptions.

It was resolved that the following addition be made to Rule 6:

> Medical officers on the permanent lists of the Defence Department, three guineas. Members admitted after June 30th in any year, half the current annual subscription for that class of member. Members engaged on a whole-time basis in medical instruction or medical research or who are occupying whole-time positions in the Government Medical Service but are not engaged in the practice of the profession, either as consultant or otherwise, may apply to the Council for a reduction in the rates of subscription and each case will be considered on its merits.

The above was passed at the Council meeting, May 23, 1928.

Cessation of Membership.

It was resolved that instead of Rule 7(a) the following be substituted:

> If a member's subscription is not paid by December 31st he (she) *ipso facto* ceases to be a member as from that day (unless any ethical inquiry as to conduct is pending), without prejudice to his liability to the Association. If he pays the overdue subscription by the following March 31st, he can, if eligible, be restored to membership without election. Where membership terminates by failure to pay the subscription, the person in question is not eligible for reelection until he has paid the year or half year's subscription which was due from him when his former membership ceased.

The above was passed at a Council meeting, June 14, 1928.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been nominated for election as members of the New South Wales Branch of the British Medical Association:

Mallam, Harry Roger, M.B., Ch.M., 1926 (Univ. Sydney), Highbury, Armidale.
Whitehead, Hebden Hoffman, M.B., B.S., 1920 (Univ. Melbourne), Deniliquin.
Goulson, Eric Hyman, M.B., B.S., 1928 (Univ. Sydney), 9, Billyard Avenue, Elizabeth Bay.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Conolly, Henry Willans, M.B., 1909 (Univ. Sydney), 83A, Darlinghurst Road, Darlinghurst.
Marshall, Stuart Vance, M.B., 1925 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.
McDonald, Kenneth David, M.B., B.S., 1928 (Univ. Sydney), 109, Burns Bay Road, Lane Cove.
Rau, Noel, M.B., B.S., 1927 (Univ. Sydney), 67, Birriga Road, Bellevue Hill.
Rennie, Harry Maynard, M.B., B.S., 1928 (Univ. Sydney), 24, Wolseley Road, Point Piper.
Russell, Gerald, M.B., B.S., 1927 (Univ. Sydney), Post Office, Cronulla.
Vout, Lawrence, M.B., B.S., 1927 (Univ. Sydney), Ulmarra.
Walker, Jack Frederick, M.B., Ch.M., 1927 (Univ. Sydney), Cressy Street, Canterbury.
Whittemore, John Bede, M.B., B.S., 1927 (Univ. Sydney), Willison Road and Wallace Street, Carlton.

Correspondence.

RESEARCH IN MATERNAL MORTALITY.

SIR: During twenty-five years of private practice some two thousand obstetric cases were attended with a mortality of 3‰. Two cases were conspicuous in the last years at an interval of about two years, two fatal confinements of the wives of the same man, one died of eclampsia, one of acute toxæmia, both shortly after confinement. They were both one of twins and somewhat poor physique. The husband stated he had coitus with his wives right up to their entrance to the home—a practice believed by some ignorant persons to insure easy labours. Is not *homo sapiens* the only sinner against Nature in this respect and is it not possible that she shows her displeasure in manufacturing a harmful hormone that lowers resistance to a fatal degree in certain cases?

Yours, etc.,
"GENERAL PRACTITIONER."

September 25, 1928.

Congress Notes.

AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION).

THE Executive Committee of the third session of the Australasian Medical Congress (British Medical Association) has decided to hold the session from September 2 to September 7, 1929. The Senate of the University of Sydney has kindly placed the Great Hall and the University buildings at the disposal of Congress for the period named.

It is proposed to send in THE MEDICAL JOURNAL OF AUSTRALIA at a later date a form of application for membership of Congress. It is hoped that members of the Branches will apply for membership of the Congress in good time, in order that the Executive Committee may make suitable arrangements. It is anticipated that the third session will be as successful as were the first session in Melbourne and the second session in Dunedin. The President of the third session is Sir Alexander MacCormick and the Honorary Secretaries are Dr. A. A. Palmer and Dr. T. W. Lipscomb.

Congresses.

THE Honorary Secretary of the College of Surgeons of Australasia requests us to announce that a pressing invitation has been received from the Chairman of the Hawaian Committee of the Pan-Pacific Surgical Congress to be held in Honolulu in August, 1929, to Australasian surgeons to attend and if possible read papers at that meeting. Arrangements will be made to provide free of cost board and lodging in Honolulu for ten Australian delegates for the period of the Congress. The *Aorangi* will arrive in Honolulu on August 9, 1929, and leave on the return to Australia on August 28, 1929. It is suggested that some American surgeons may proceed to New Zealand and Australia with the returning Australian delegates on the *Aorangi* after the meeting. It is hoped to arrange sessions of the Fellows of the College of Surgeons of Australasia in the Dominion and in the various States to meet the American surgeons at clinical work. Fellows of the College of Surgeons of Australasia proposing to attend the Congress at Honolulu on the dates indicated are requested to communicate with the Honorary Secretary, 13, Collins Street, Melbourne, who will be pleased to give them any information in his possession.

NOTICE.

Wanted Copies of "The Medical Journal of Australia" of October 27, 1928.

WE have reason to believe that two copies of our issue of October 27, 1928, were sent in error to several medical practitioners. Those who have received two copies, are requested to return one to the office of the journal. Postage will be refunded. We are further desirous of purchasing clean copies of the same issue at their face value of one shilling.

University Intelligence.

THE UNIVERSITY OF SYDNEY.

A MEETING of the Senate of the University of Sydney was held on October 8, 1928.

The following degrees were conferred in person:

Master of Surgery (Ch.M.):—Arthur Muir Welsh, M.B.

The following degrees were conferred *in absentia*:

Bachelor of Medicine (M.B.) and *Bachelor of Surgery* (B.S.): Rawdon Hamilton Kenny (first class honours), Marjorie Jean Lyon (second class honours), John William Osborne (second class honours), William Ernest Edward Langford, Edna Florence MacKenzie.

Master of Surgery (Ch.M.): George Reginald Cope Cotton, M.B., Charles George McDonald, M.B.

The following Examiners were appointed for the Dental Board examinations: Professor H. Priestly (Physiology), Dr. L. A. Carter (Mechanical Dentistry), Mr. A. J. Arnott, B.D.S. (Dental Surgery and Operative Surgery), Dr. H. J. Wilkinson (Anatomy), Dr. A. M. Welsh (Dental Pathology and Bacteriology), Dr. W. R. Morris (Dental *Materia Medica*), Professor Eastaugh (Metallurgy), Mr. W. A. Purves (Educational Subjects).

The following appointments were approved:

Mr. R. M. C. Gunn, B.V.Sc., B.Sc.Agr., M.R.C.V.S., Lecturer and Demonstrator in the Department of Veterinary Science, to be Acting Professor of Veterinary Science in 1929 during the absence of Professor J. Douglas Stewart on leave.

Dr. Brian Windeyer as Radium Registrar in connexion with Cancer Research and Treatment activities at the Royal Prince Alfred Hospital.

Dr. K. D. McDonald as part-time Demonstrator in the Department of Anatomy.

The use of the Great Hall and University buildings was granted to the Australasian Medical Congress for the holding of its Third Session in September, 1929.

Books Received.

A TEXT-BOOK OF FRACTURES AND DISLOCATIONS COVERING THEIR PATHOLOGY, DIAGNOSIS AND TREATMENT, by Kellogg Speed, S.B., M.D., F.A.C.S.; 1928. Philadelphia: Lea and Febiger. Royal 8vo., pp. 952, with illustrations. Price: $11.00 net.

THE TREATMENT OF DIABETES MELLITUS, by Elliott P. Joslin, M.D. (Harvard), M.A. (Yale); Fourth Edition, Enlarged, Revised and Rewritten; 1928. Philadelphia: Lea and Febiger; Sydney: Angus and Robertson, Limited. Royal 8vo., pp. 998, with illustrations. Price: 45s. net.

Diary for the Month.

Nov. 6.—Tasmanian Branch, B.M.A.: Council.
Nov. 7.—Western Australian Branch, B.M.A.: Council.
Nov. 8.—Victorian Branch, B.M.A.: Council.
Nov. 9.—Queensland Branch, B.M.A.: Council.
Nov. 13.—Tasmanian Branch, B.M.A.: Branch.
Nov. 13.—New South Wales Branch, B.M.A.: Ethics Committee.
Nov. 14.—Victorian Branch, B.M.A.: Branch.
Nov. 15.—New South Wales Branch, B.M.A.: Clinical Meeting.
Nov. 16.—Eastern Suburbs Medical Association, New South Wales.
Nov. 19.—New South Wales Branch, B.M.A.: Organization and Science Committee.
Nov. 20.—Tasmanian Branch, B.M.A.: Council.
Nov. 20.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
Nov. 21.—Western Australian Branch, B.M.A.: Branch.
Nov. 21.—Central Northern Medical Association, New South Wales.
Nov. 21.—Section of Obstetrics and Gynæcology, New South Wales Branch, B.M.A.
Nov. 24.—Queensland Branch, B.M.A.: Council.
Nov. 27.—Illawarra Suburbs Medical Association, New South Wales.
Nov. 27.—New South Wales Branch, B.M.A.: Medical Politics Committee.
Nov. 28.—Victorian Branch, B.M.A.: Council.

Medical Appointments.

Dr. Arthur Charles Savage has been appointed Acting Junior Medical Officer, Parkside Mental Hospital, South Australia.

* * *

Dr. Eric Ambrose Claude Marshman (B.M.A.) has been appointed Government Medical Officer at The Rock, New South Wales.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii.

COMMONWEALTH OF AUSTRALIA: Medical Officer.
ROCKHAMPTON HOSPITALS BOARD: Junior Resident Medical Officer.
ROYAL HOSPITAL FOR WOMEN, PADDINGTON, SYDNEY: Resident Medical Officer.
SAINT VINCENT'S HOSPITAL, SYDNEY: Honorary Clinical Assistant.
SYDNEY HOSPITAL, SYDNEY: Clinical Assistant.
THE WOMEN'S HOSPITAL, CROWN STREET, SYDNEY: Junior Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. Marrickville United Friendly Societies' Dispensary. People's Prudential Benefit Society. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing. Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Contract Practice Appointments in South Australia. Booleroo Centre Medical Club.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Medical practitioners are requested not to apply for appointments to position at the Hobart General Hospital, Tasmania, without first having communicated with the Editor of THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £1 for Australia and £2 5s. abroad *per annum* payable in advance